FIG. 1

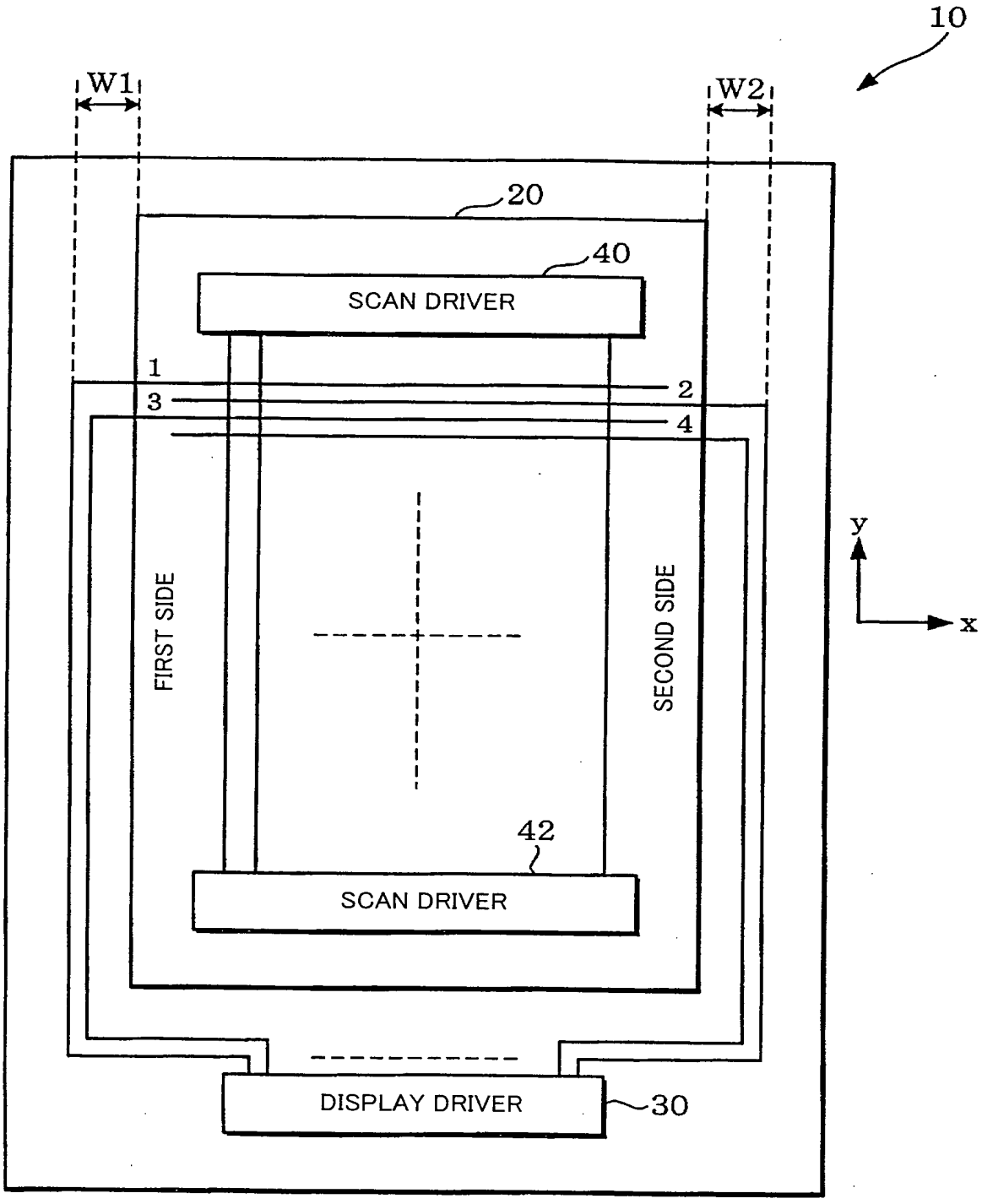

10
W1
W2
20
40
SCAN DRIVER
1
2
3
4
FIRST SIDE
SECOND SIDE
y
x
42
SCAN DRIVER
DISPLAY DRIVER
30

FIG. 2

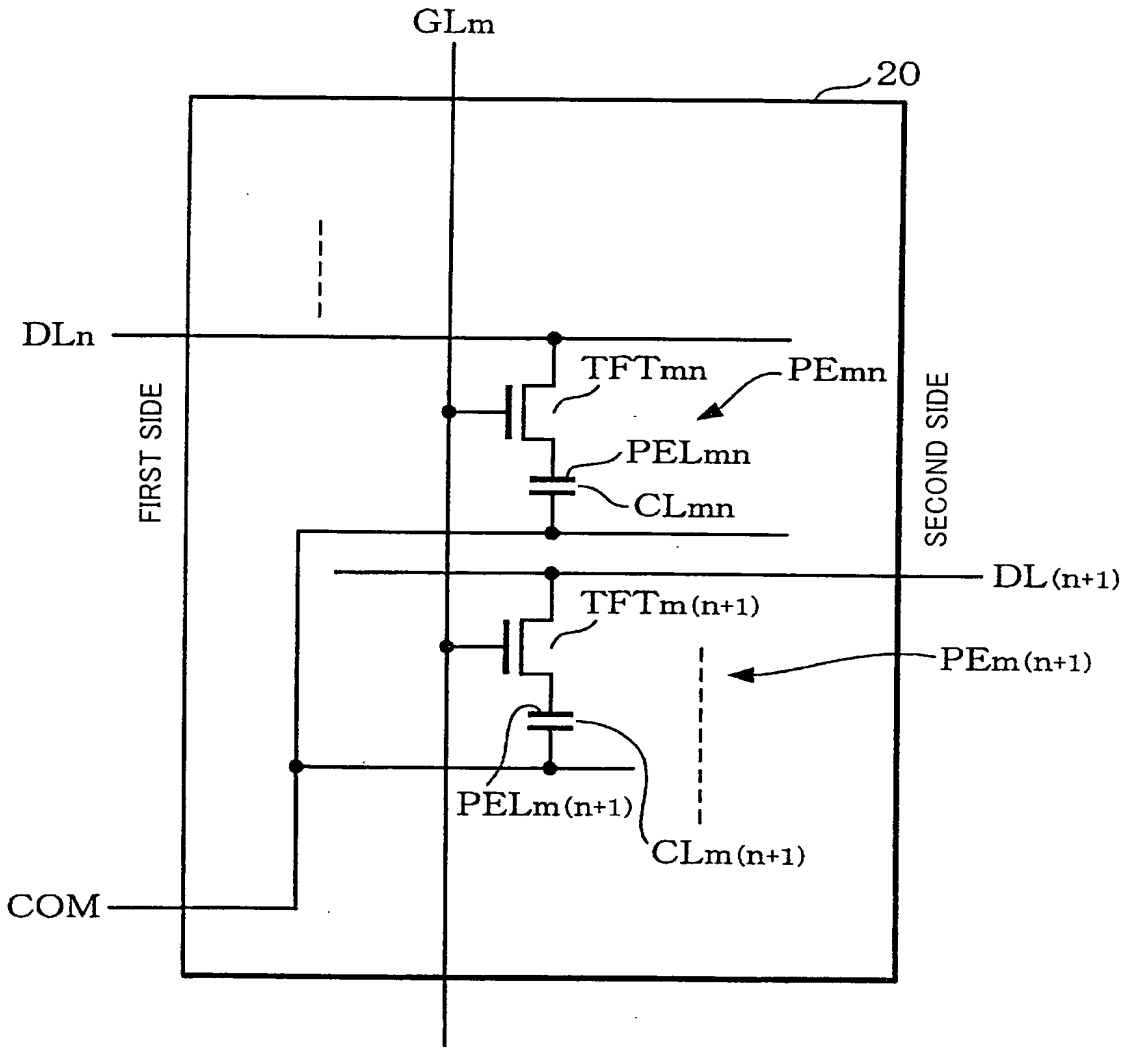

GLm
20
DLn
FIRST SIDE
TFTmn
PEmn
PELmn
CLmn
SECOND SIDE
DL(n+1)
TFTm(n+1)
PEm(n+1)
PELm(n+1)
CLm(n+1)
COM

FIG. 3

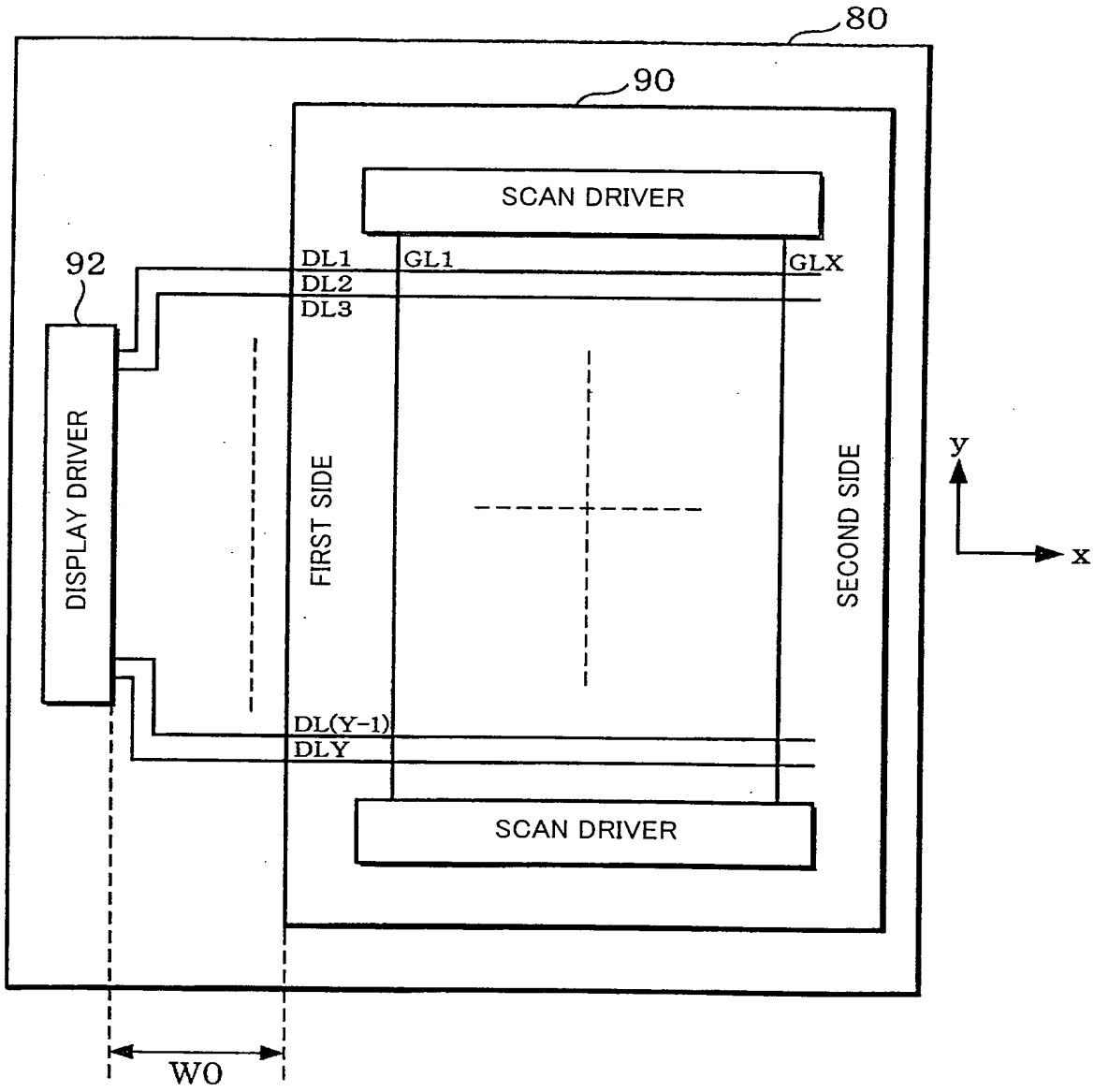

80
90
SCAN DRIVER
92
DL1
DL2
DL3
GL1
GLX
DISPLAY DRIVER
FIRST SIDE
SECOND SIDE
y
x
DL(Y-1)
DLY
SCAN DRIVER
W0

FIG. 4

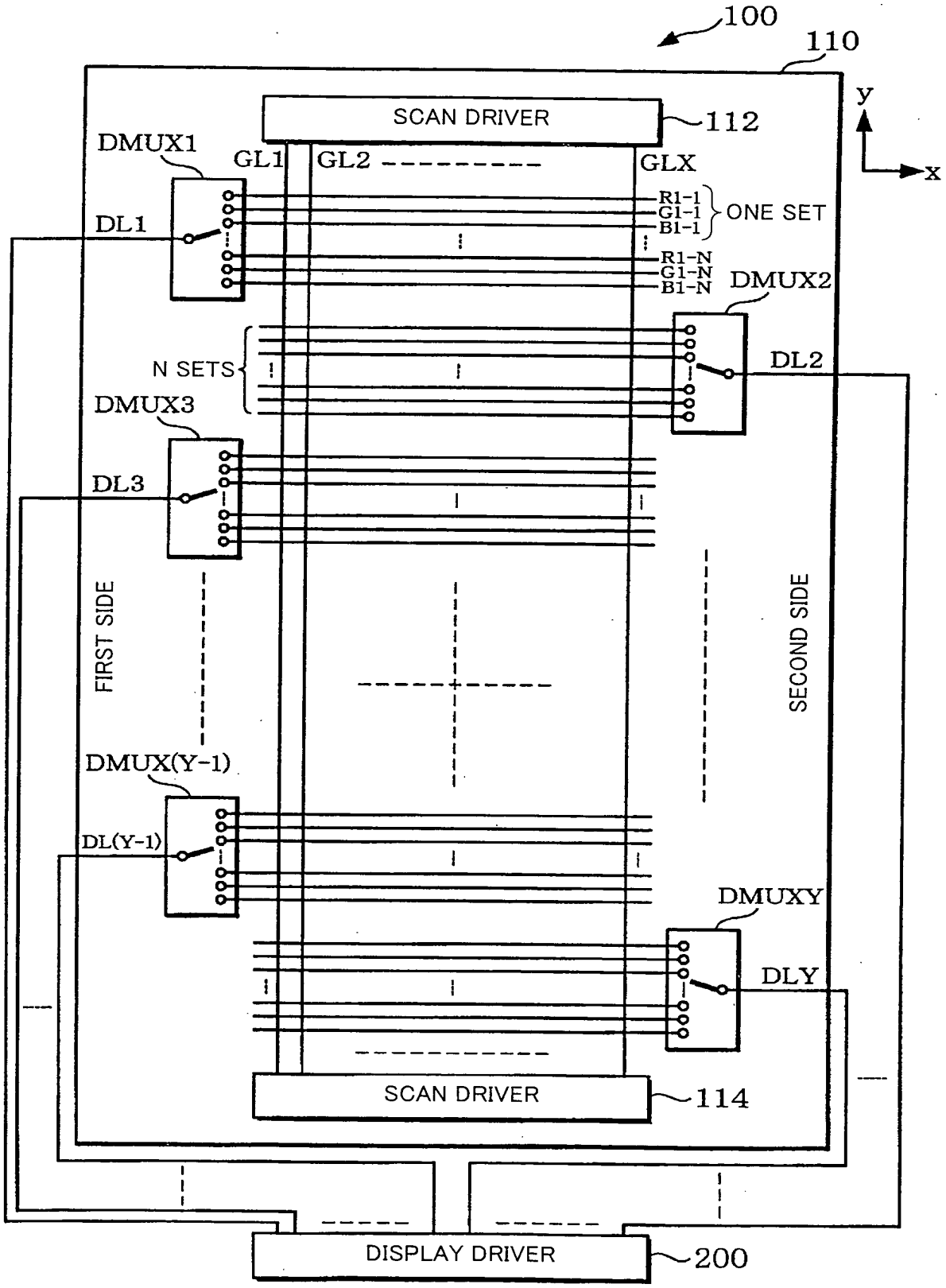

100
110
y
x
SCAN DRIVER
112
DMUX1
GL1
GL2
GLX
R1-1
G1-1
B1-1
ONE SET
DL1
R1-N
G1-N
B1-N
DMUX2
N SETS
DL2
DMUX3
DL3
FIRST SIDE
SECOND SIDE
DMUX(Y-1)
DL(Y-1)
DMUXY
DLY
SCAN DRIVER
114
DISPLAY DRIVER
200

FIG. 5

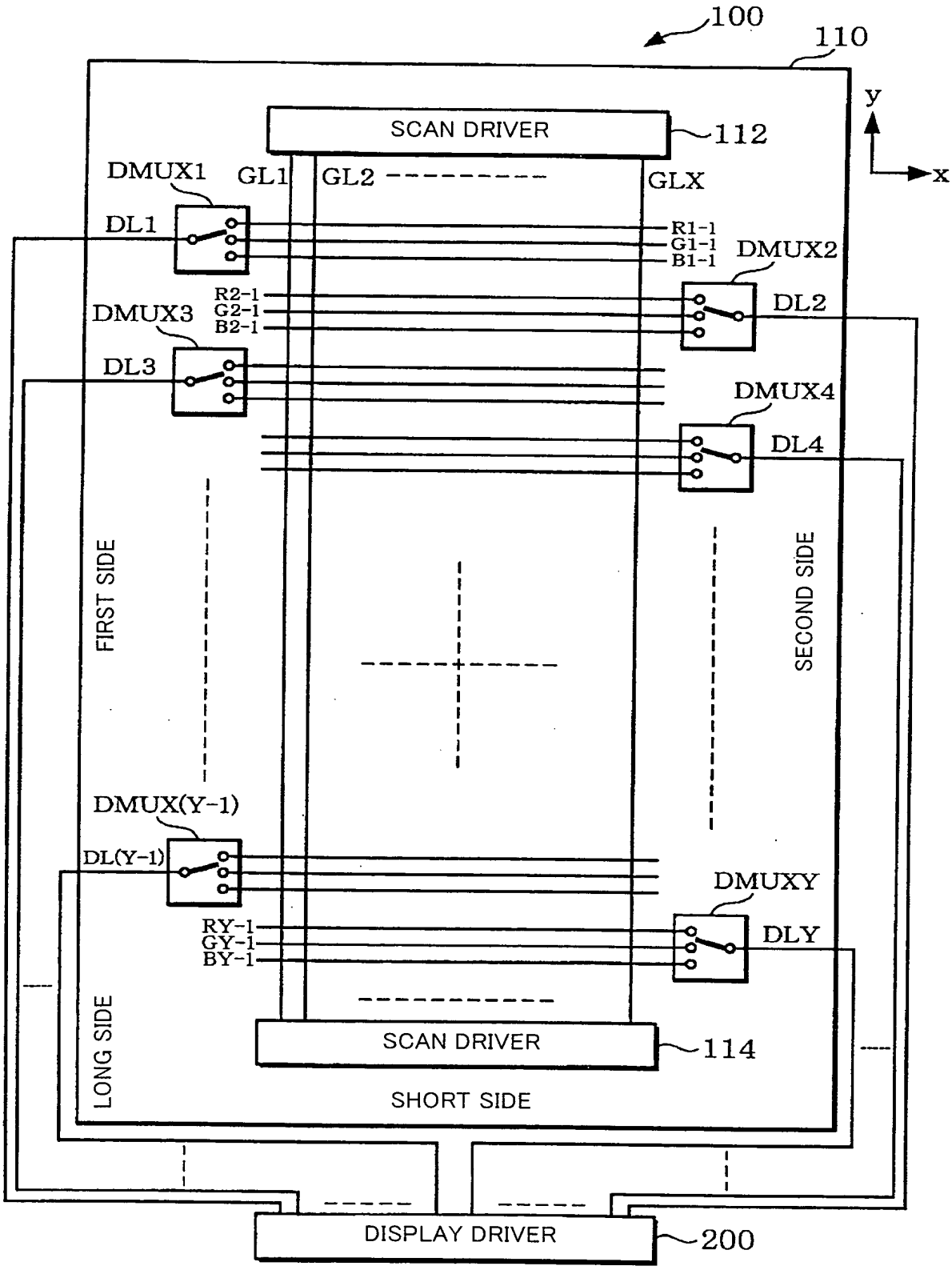

100
110
y
x
SCAN DRIVER
112
DMUX1
GL1
GL2
GLX
DL1
R1-1
G1-1
B1-1
DMUX2
R2-1
G2-1
B2-1
DMUX3
DL2
DL3
DMUX4
DL4
FIRST SIDE
SECOND SIDE
DMUX(Y-1)
DL(Y-1)
DMUXY
RY-1
GY-1
BY-1
DLY
LONG SIDE
SCAN DRIVER
114
SHORT SIDE
DISPLAY DRIVER
200

FIG. 6

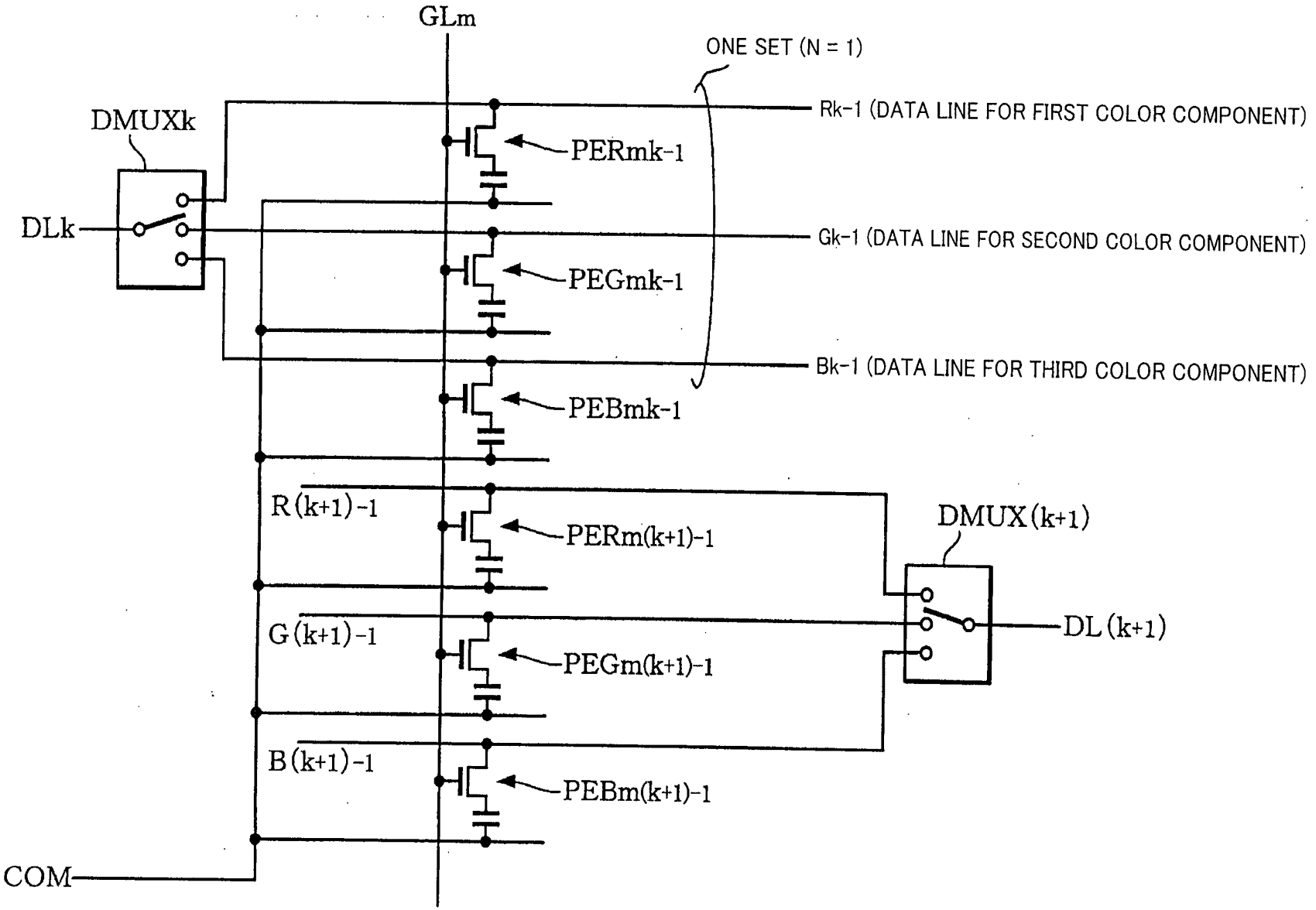

GLm
ONE SET (N = 1)
DMUXk
DLk
Rk-1 (DATA LINE FOR FIRST COLOR COMPONENT)
Gk-1 (DATA LINE FOR SECOND COLOR COMPONENT)
Bk-1 (DATA LINE FOR THIRD COLOR COMPONENT)
PERmk-1
PEGmk-1
PEBmk-1
R(k+1)-1
G(k+1)-1
B(k+1)-1
PERm(k+1)-1
PEGm(k+1)-1
PEBm(k+1)-1
DMUX(k+1)
DL(k+1)
COM

FIG. 7A

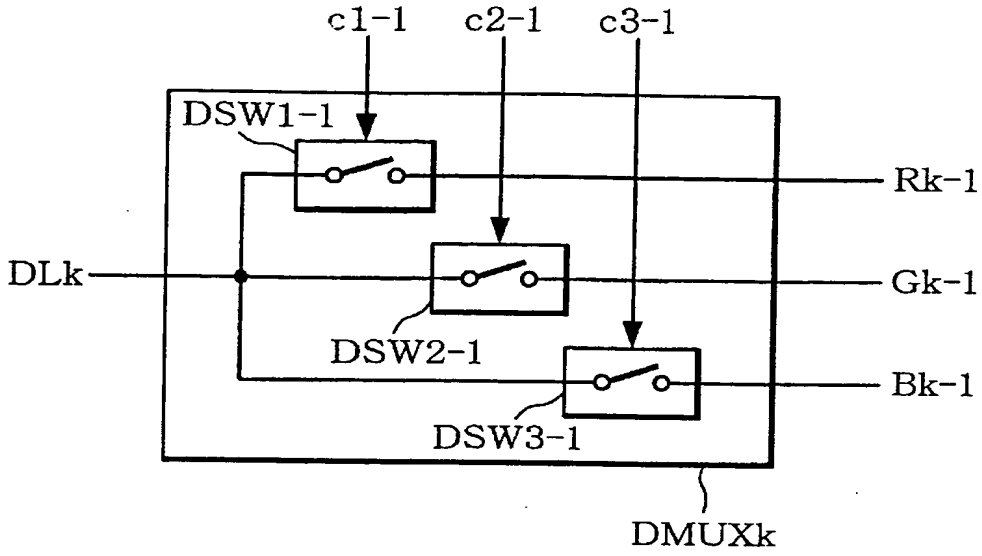

c1-1
c2-1
c3-1
DSW1-1
Rk-1
DLk
Gk-1
DSW2-1
Bk-1
DSW3-1
DMUXk

FIG. 7B

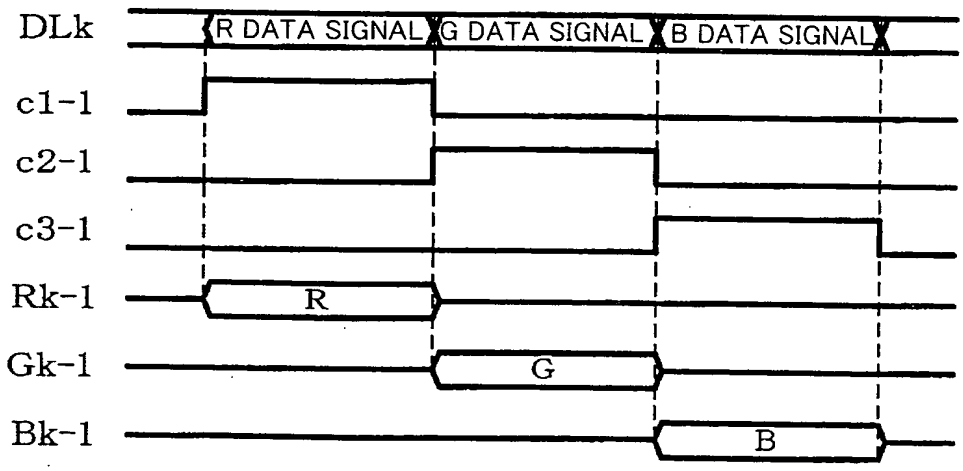

DLk
R DATA SIGNAL
G DATA SIGNAL
B DATA SIGNAL
c1-1
c2-1
c3-1
Rk-1
R
Gk-1
G
Bk-1
B

FIG. 8

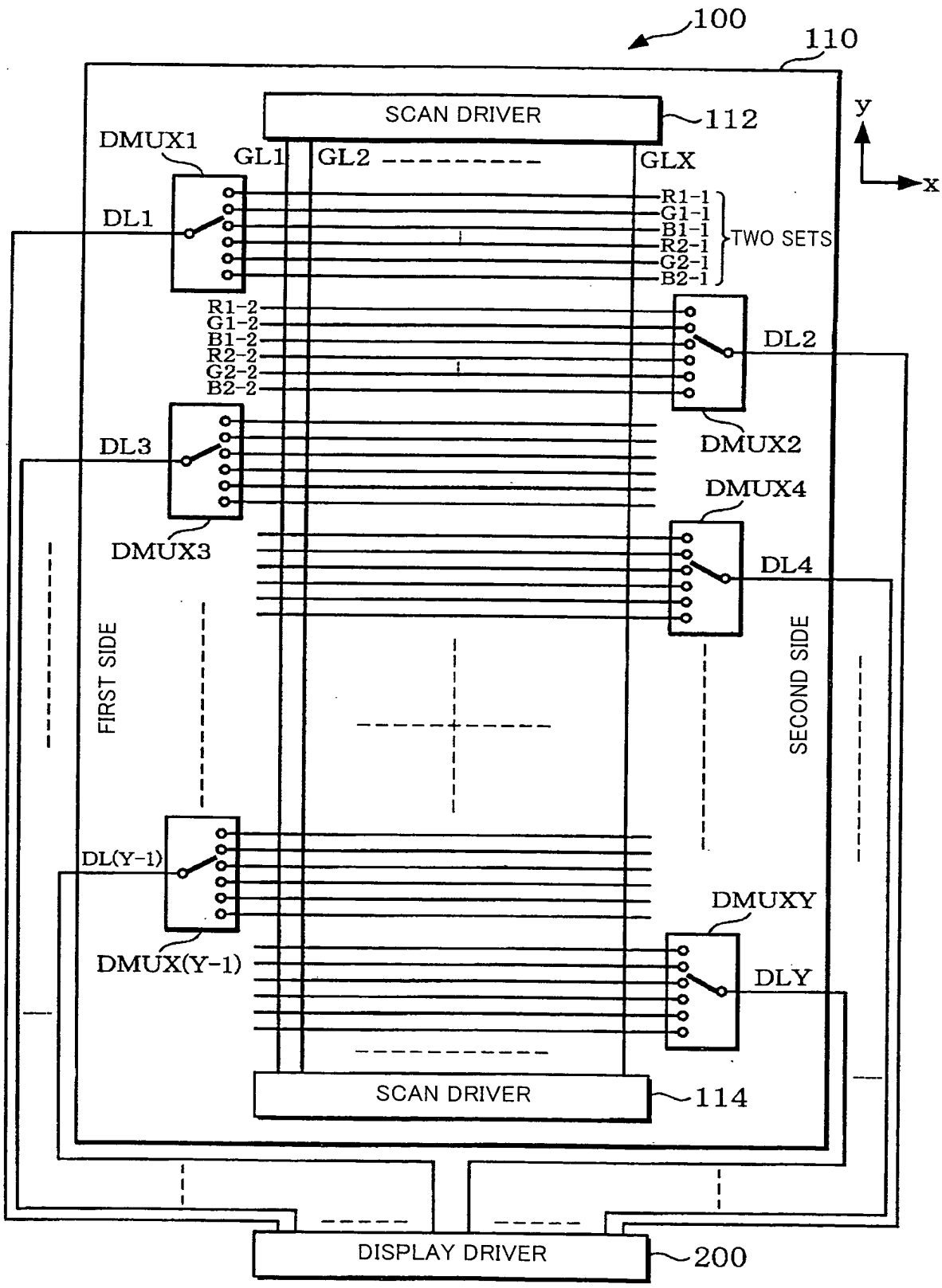

100
110
SCAN DRIVER
112
y
x
DMUX1
GL1
GL2
GLX
DL1
R1-1
G1-1
B1-1
R2-1
G2-1
B2-1
TWO SETS
R1-2
G1-2
B1-2
R2-2
G2-2
B2-2
DL2
DMUX2
DL3
DMUX4
DMUX3
DL4
FIRST SIDE
SECOND SIDE
DL(Y-1)
DMUXY
DMUX(Y-1)
DLY
SCAN DRIVER
114
DISPLAY DRIVER
200

FIG. 9A

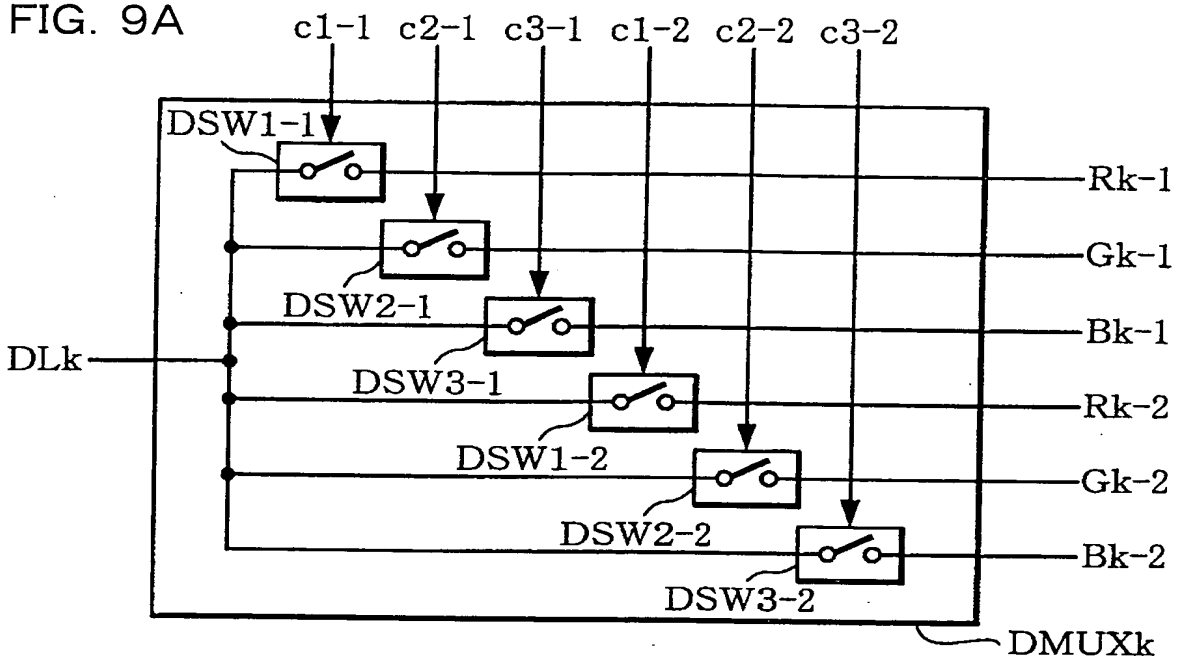

c1-1
c2-1
c3-1
c1-2
c2-2
c3-2
DSW1-1
DSW2-1
DSW3-1
DSW1-2
DSW2-2
DSW3-2
DLk
Rk-1
Gk-1
Bk-1
Rk-2
Gk-2
Bk-2
DMUXk

FIG. 9B

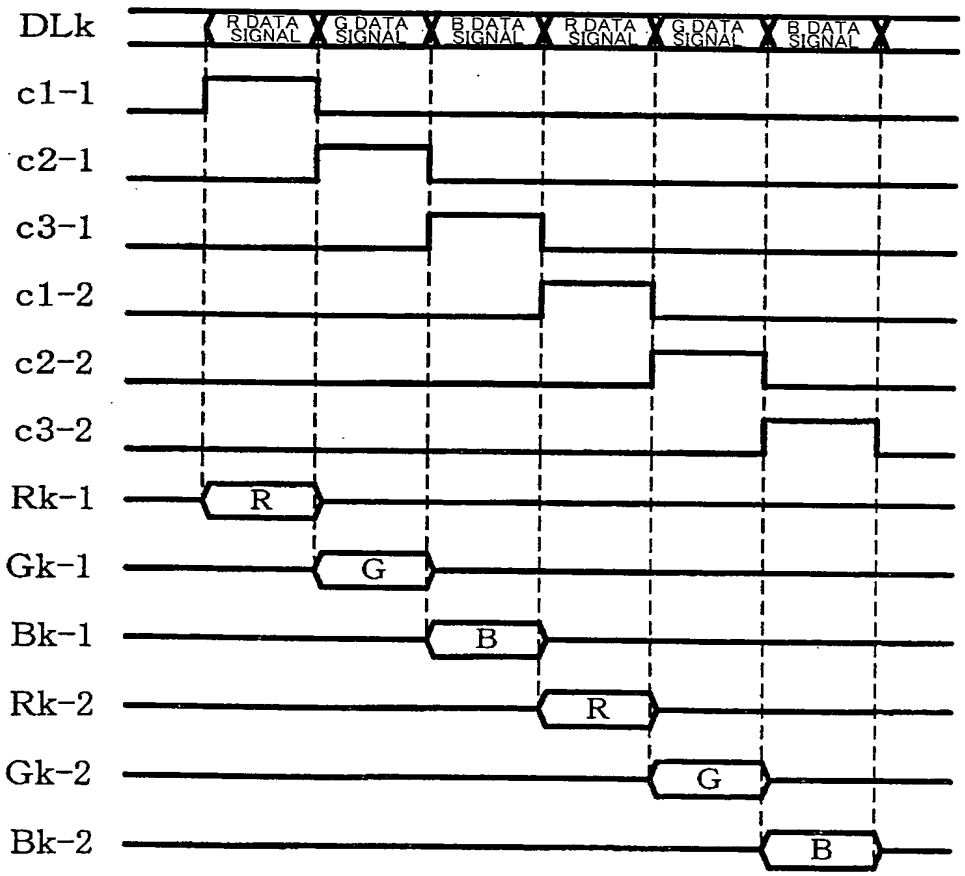

DLk
R DATA SIGNAL
G DATA SIGNAL
B DATA SIGNAL
R DATA SIGNAL
G DATA SIGNAL
B DATA SIGNAL
c1-1
c2-1
c3-1
c1-2
c2-2
c3-2
Rk-1
R
Gk-1
G
Bk-1
B
Rk-2
R
Gk-2
G
Bk-2
B

FIG. 10

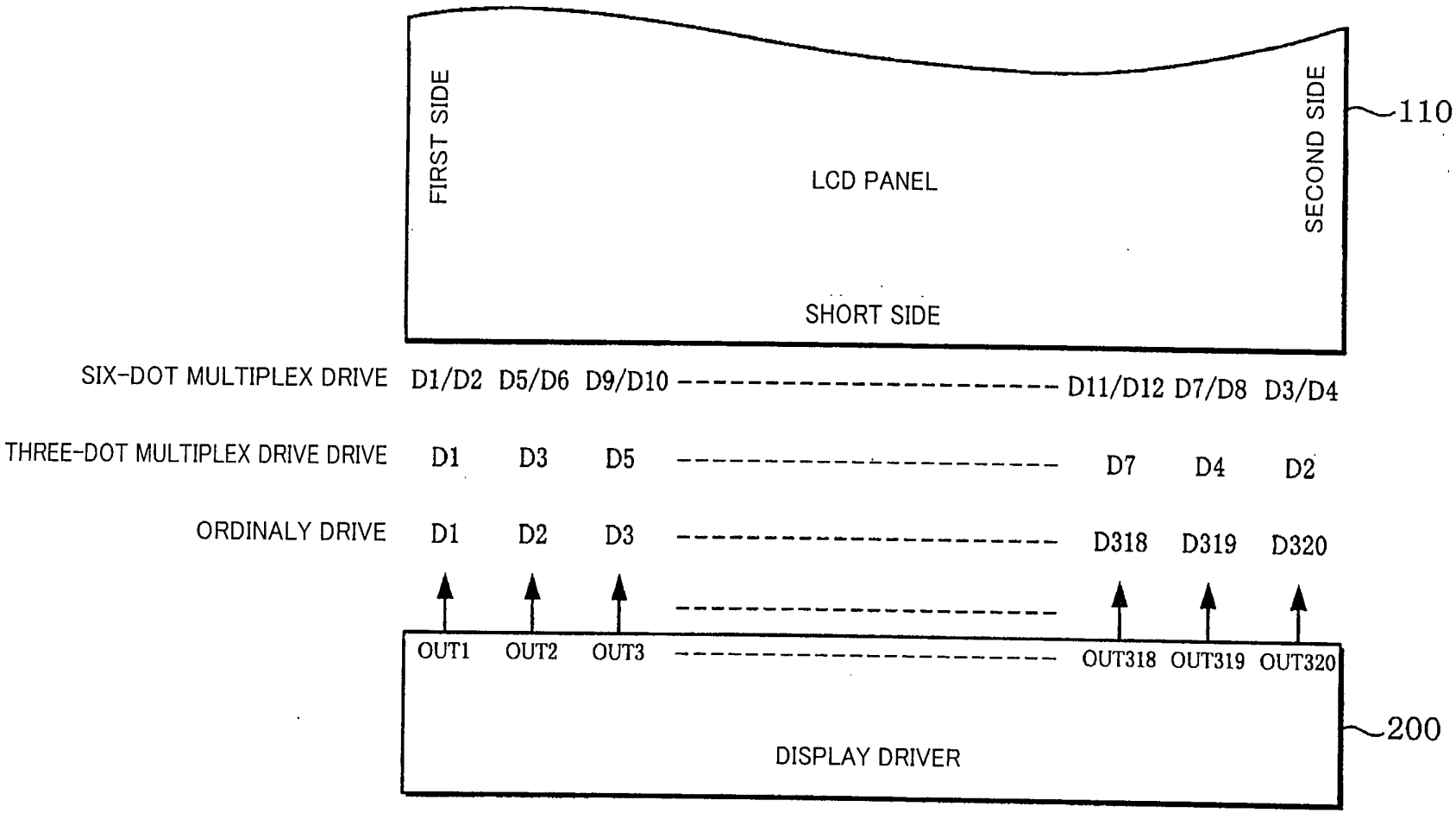

FIRST SIDE
LCD PANEL
SECOND SIDE
110
SHORT SIDE
SIX-DOT MULTIPLEX DRIVE
D1/D2 D5/D6 D9/D10 ---------- D11/D12 D7/D8 D3/D4
THREE-DOT MULTIPLEX DRIVE DRIVE
D1 D3 D5 ---------- D7 D4 D2
ORDINALY DRIVE
D1 D2 D3 ---------- D318 D319 D320
OUT1 OUT2 OUT3 ---------- OUT318 OUT319 OUT320
DISPLAY DRIVER
200

FIG. 11

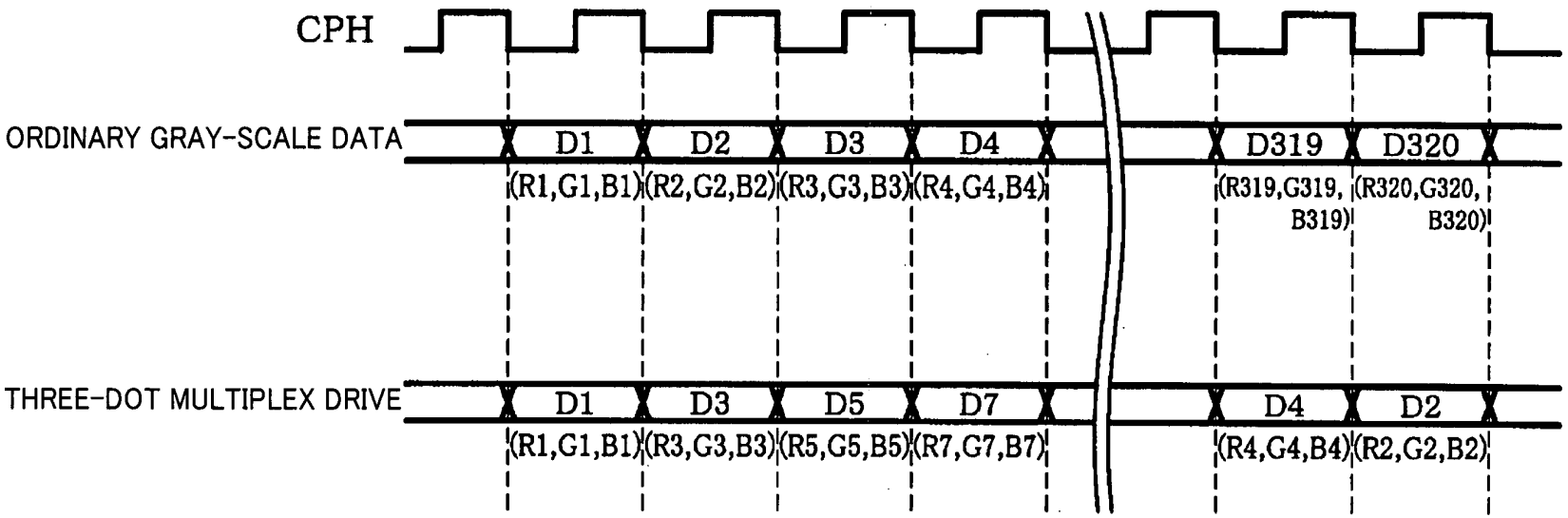

CPH
ORDINARY GRAY-SCALE DATA
D1
D2
D3
D4
D319
D320
(R1,G1,B1)
(R2,G2,B2)
(R3,G3,B3)
(R4,G4,B4)
(R319,G319, B319)
(R320,G320, B320)
THREE-DOT MULTIPLEX DRIVE
D1
D3
D5
D7
D4
D2
(R1,G1,B1)
(R3,G3,B3)
(R5,G5,B5)
(R7,G7,B7)
(R4,G4,B4)
(R2,G2,B2)

FIG. 12

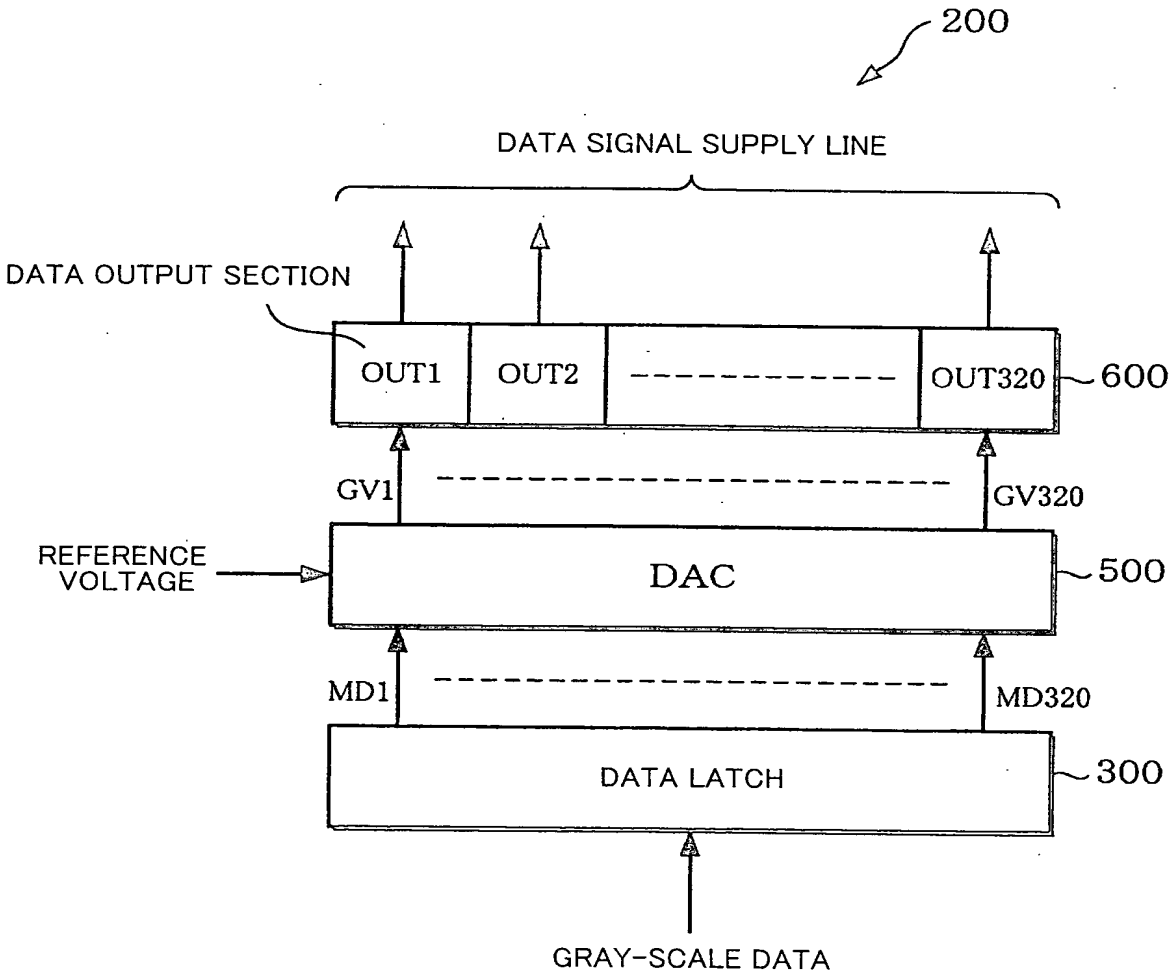

200
DATA SIGNAL SUPPLY LINE
DATA OUTPUT SECTION
OUT1
OUT2
OUT320
600
GV1
GV320
REFERENCE VOLTAGE
DAC
500
MD1
MD320
DATA LATCH
300
GRAY-SCALE DATA

FIG. 13

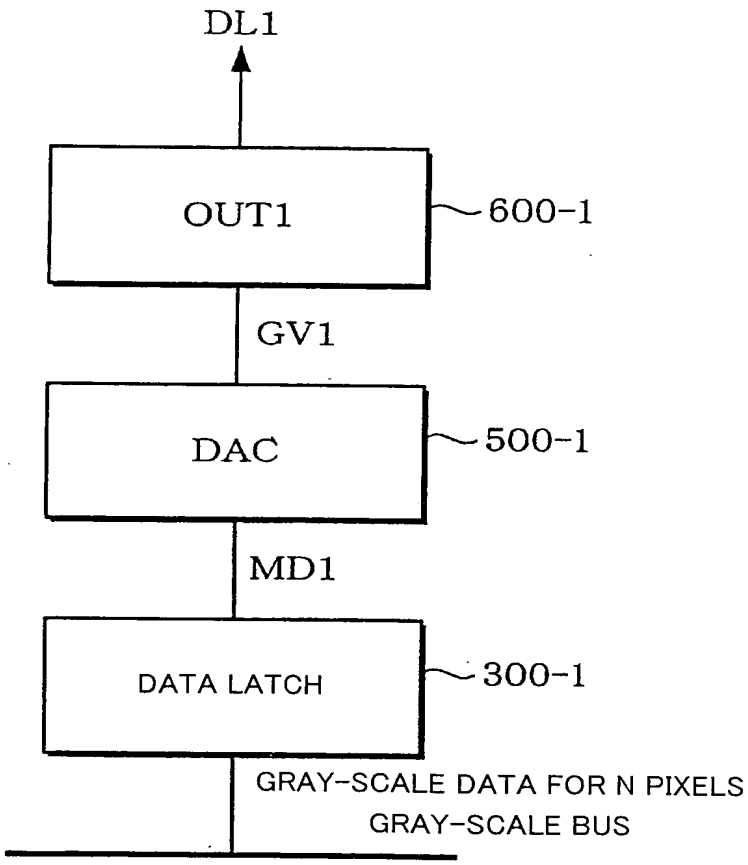

DL1
OUT1
600-1
GV1
DAC
500-1
MD1
DATA LATCH
300-1
GRAY-SCALE DATA FOR N PIXELS
GRAY-SCALE BUS

FIG. 14

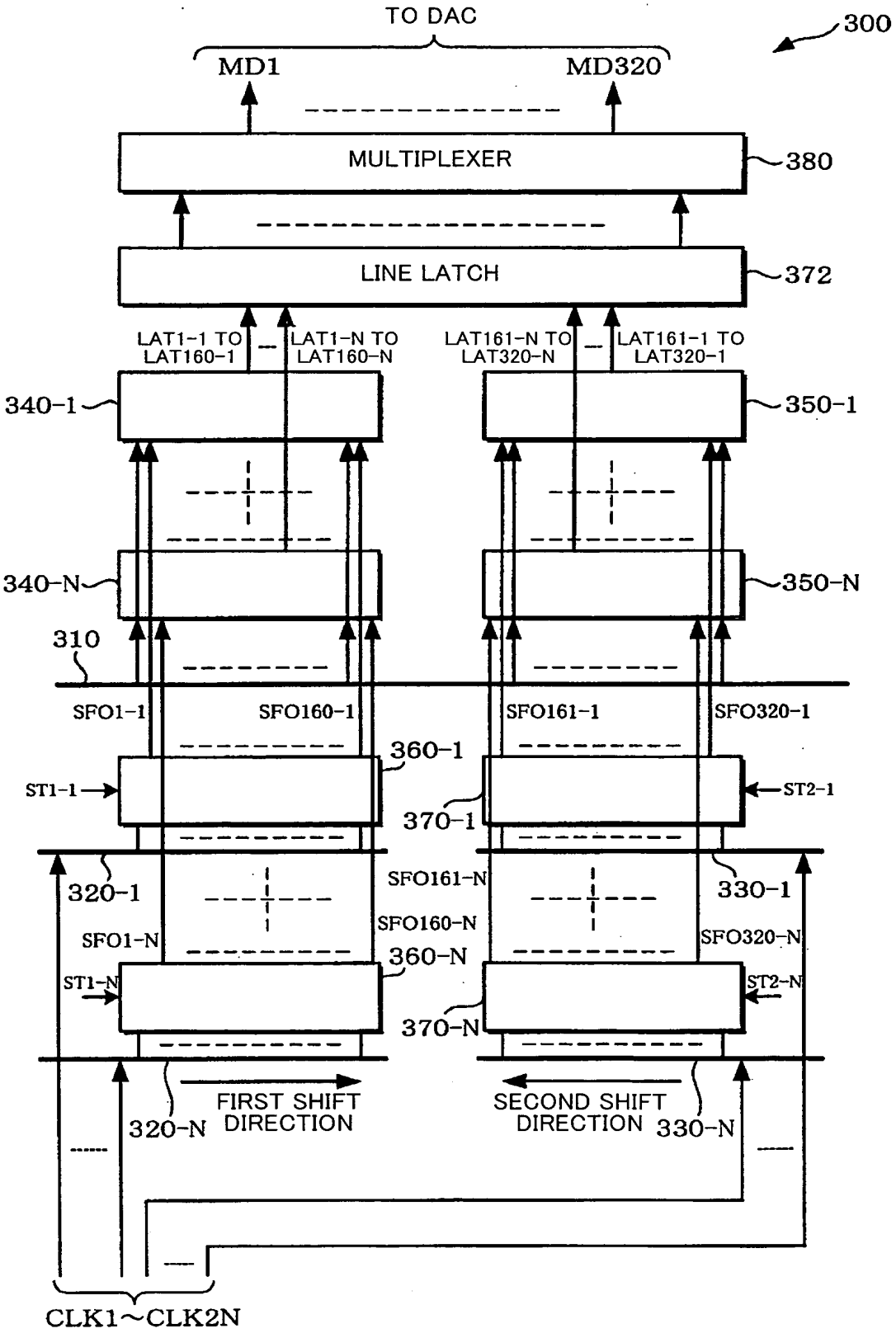

TO DAC
300
MD1
MD320
MULTIPLEXER
380
LINE LATCH
372
LAT1-1 TO LAT160-1
LAT1-N TO LAT160-N
LAT161-N TO LAT320-N
LAT161-1 TO LAT320-1
340-1
350-1
340-N
350-N
310
SFO1-1
SFO160-1
SFO161-1
SFO320-1
360-1
370-1
ST1-1
ST2-1
320-1
330-1
SFO161-N
SFO160-N
SFO1-N
SFO320-N
360-N
370-N
ST1-N
ST2-N
FIRST SHIFT DIRECTION
SECOND SHIFT DIRECTION
320-N
330-N
CLK1~CLK2N

FIG. 15

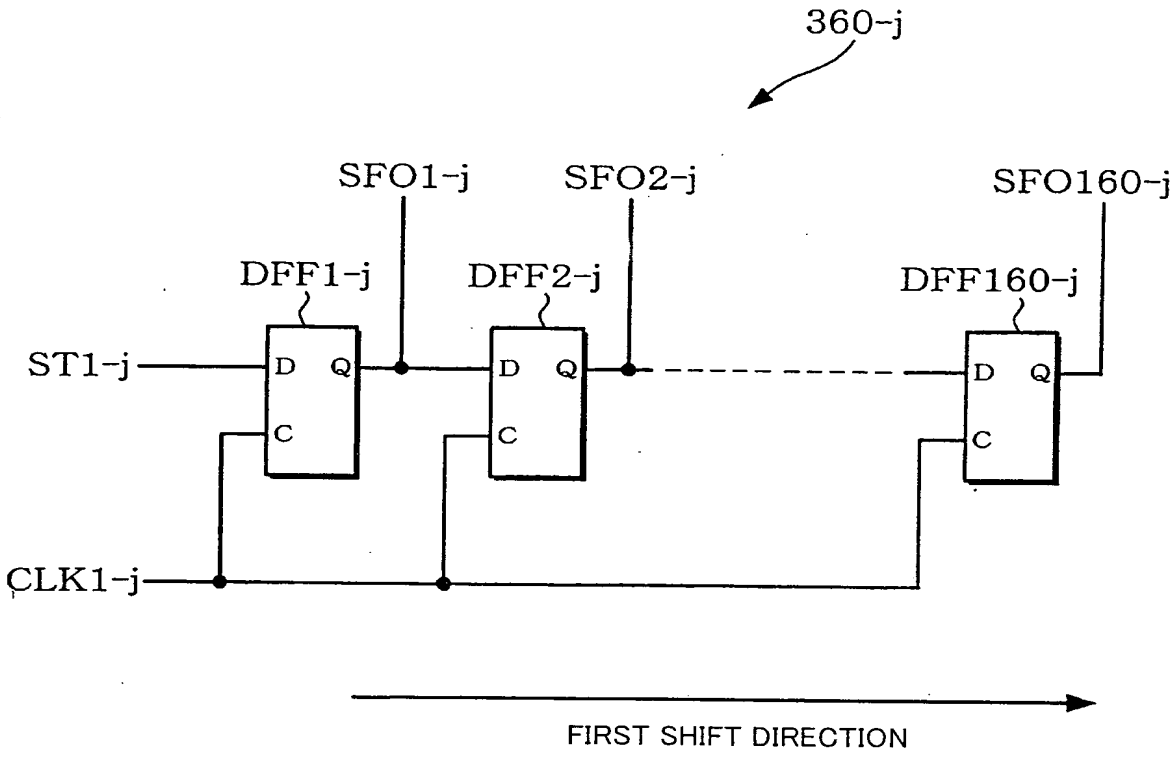

360-j
SFO1-j
SFO2-j
SFO160-j
DFF1-j
DFF2-j
DFF160-j
ST1-j
D
Q
C
CLK1-j
FIRST SHIFT DIRECTION

FIG. 16

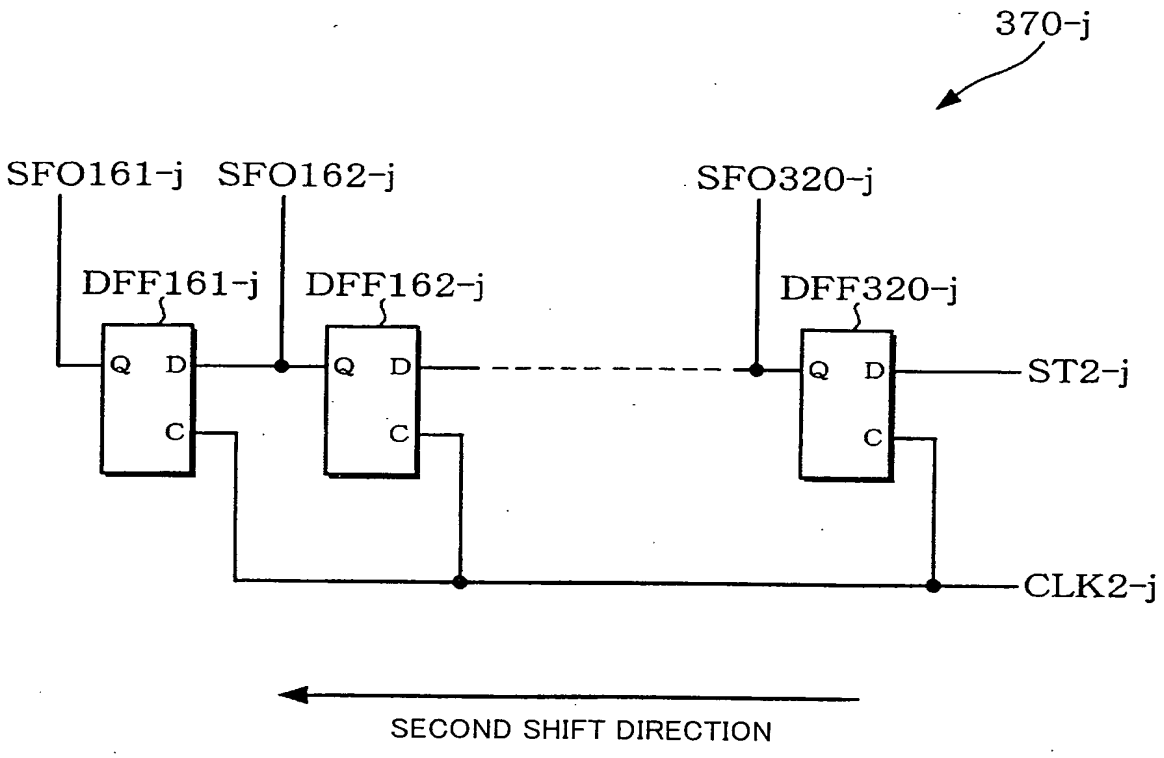

370-j
SFO161-j
SFO162-j
SFO320-j
DFF161-j
DFF162-j
DFF320-j
Q
D
C
ST2-j
CLK2-j
SECOND SHIFT DIRECTION

FIG. 17

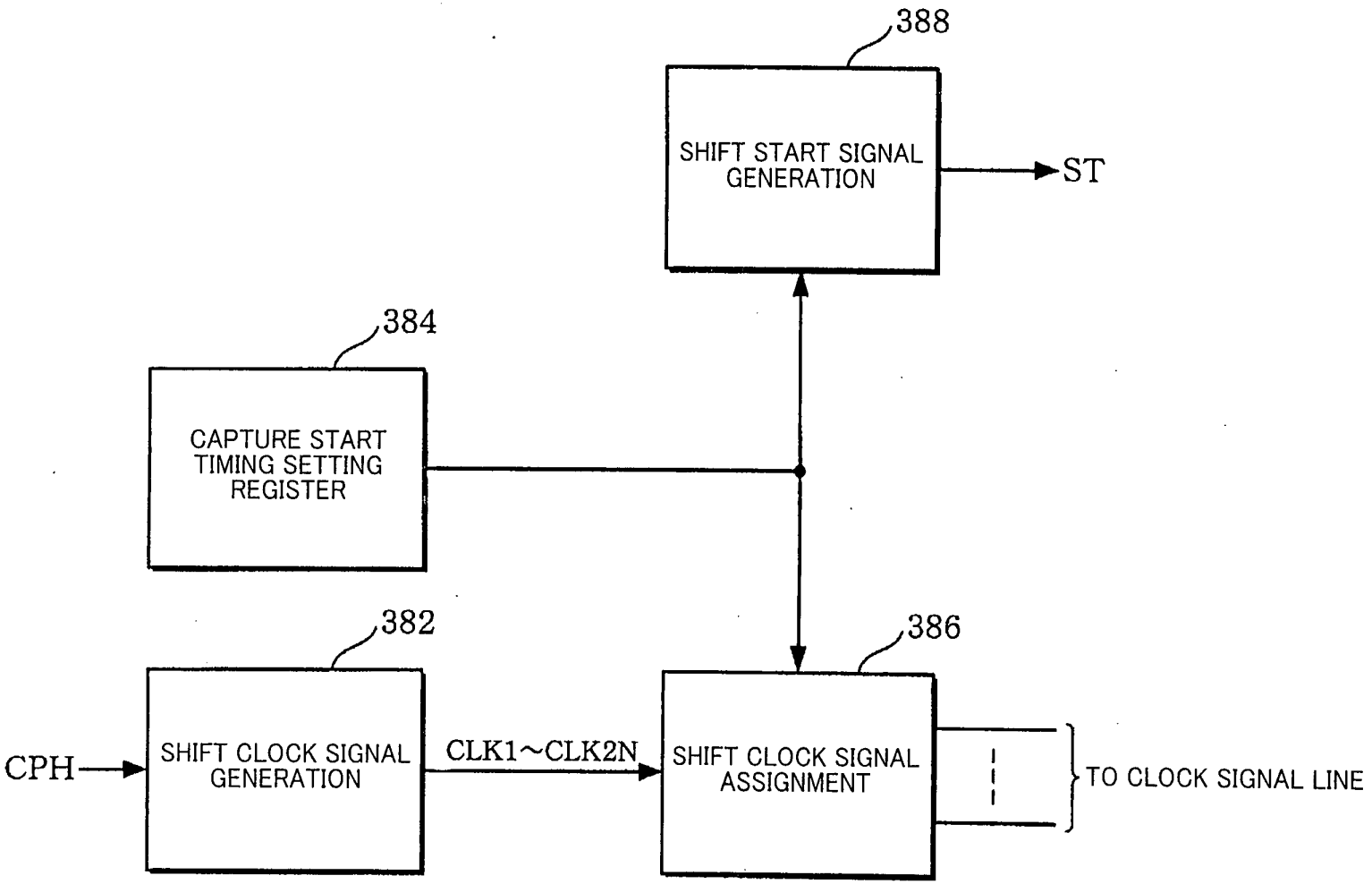

388
SHIFT START SIGNAL GENERATION
ST
384
CAPTURE START TIMING SETTING REGISTER
382
386
CPH
SHIFT CLOCK SIGNAL GENERATION
CLK1~CLK2N
SHIFT CLOCK SIGNAL ASSIGNMENT
TO CLOCK SIGNAL LINE

FIG. 18

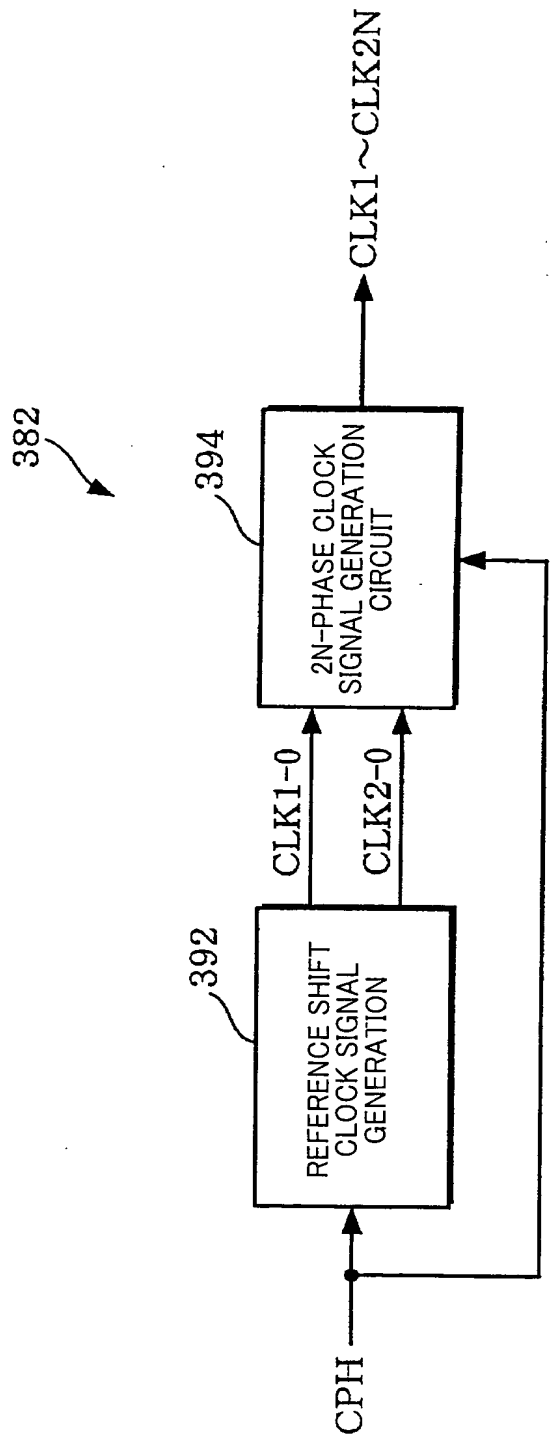

382
394
2N-PHASE CLOCK SIGNAL GENERATION CIRCUIT
CLK1~CLK2N
CLK1-0
CLK2-0
392
REFERENCE SHIFT CLOCK SIGNAL GENERATION
CPH

FIG. 19

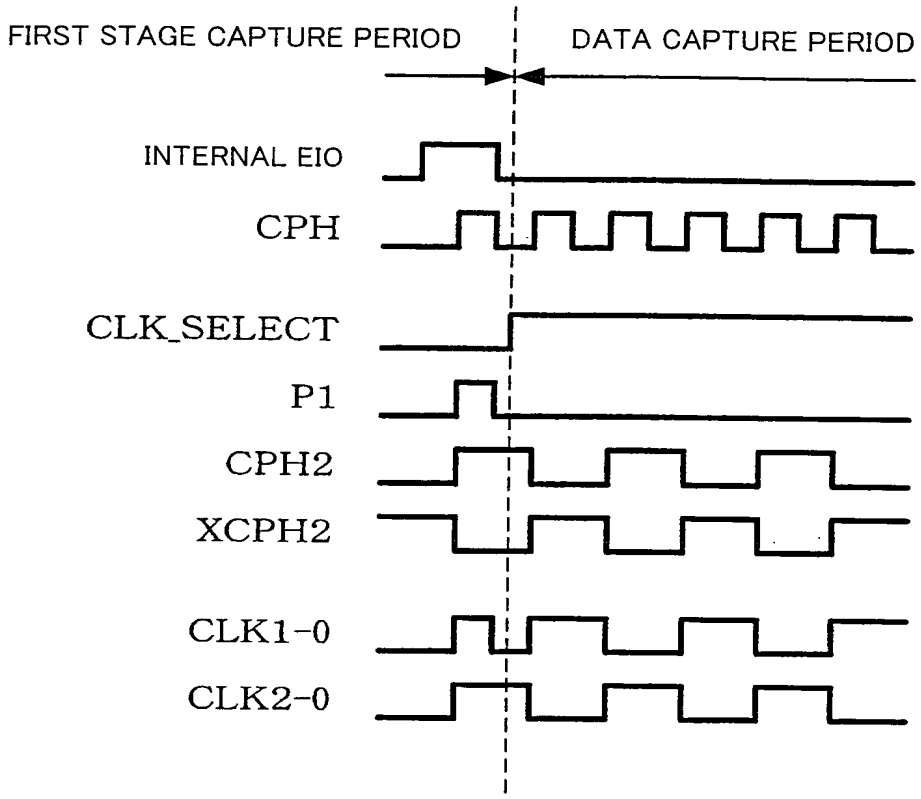

FIRST STAGE CAPTURE PERIOD
DATA CAPTURE PERIOD
INTERNAL EIO
CPH
CLK_SELECT
P1
CPH2
XCPH2
CLK1-0
CLK2-0

FIG. 20

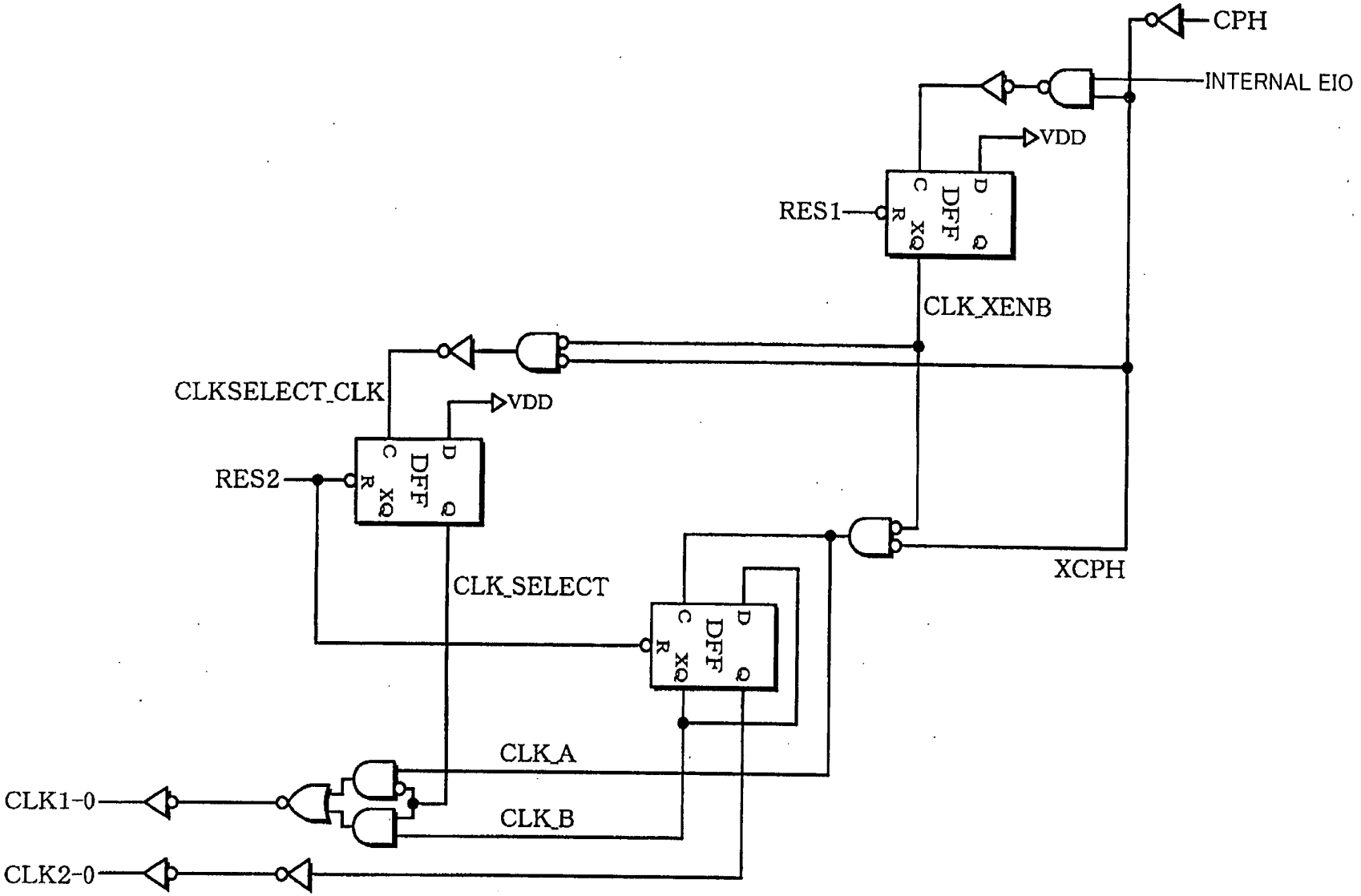

CPH
INTERNAL EIO
VDD
RES1
C
D
R
XQ
DFF
Q
CLK_XENB
CLKSELECT_CLK
VDD
RES2
C
D
R
XQ
DFF
Q
CLK_SELECT
XCPH
C
D
R
XQ
DFF
Q
CLK_A
CLK1-0
CLK_B
CLK2-0

FIG. 21

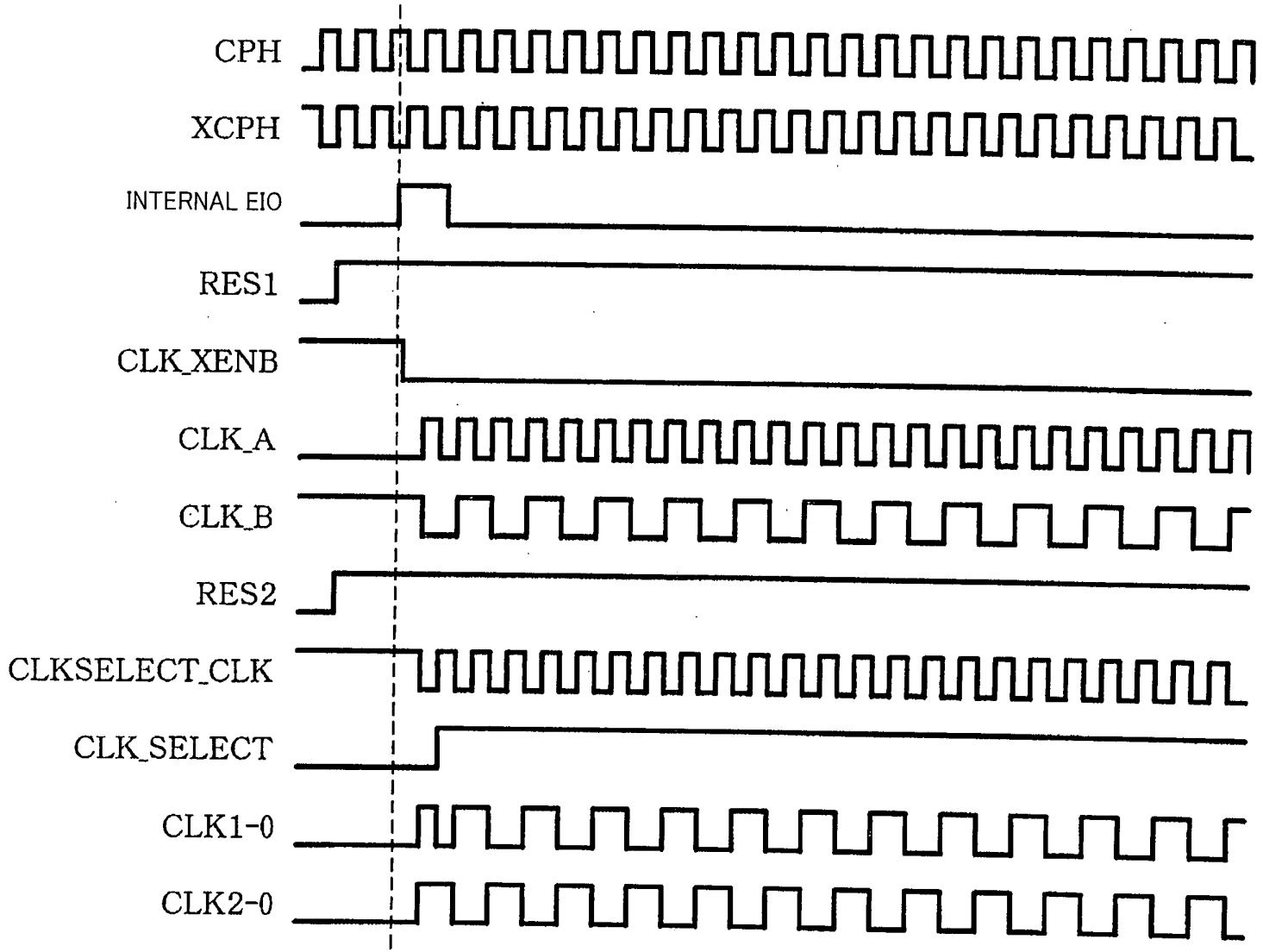

CPH
XCPH
INTERNAL EIO
RES1
CLK_XENB
CLK_A
CLK_B
RES2
CLKSELECT_CLK
CLK_SELECT
CLK1-0
CLK2-0

FIG. 22

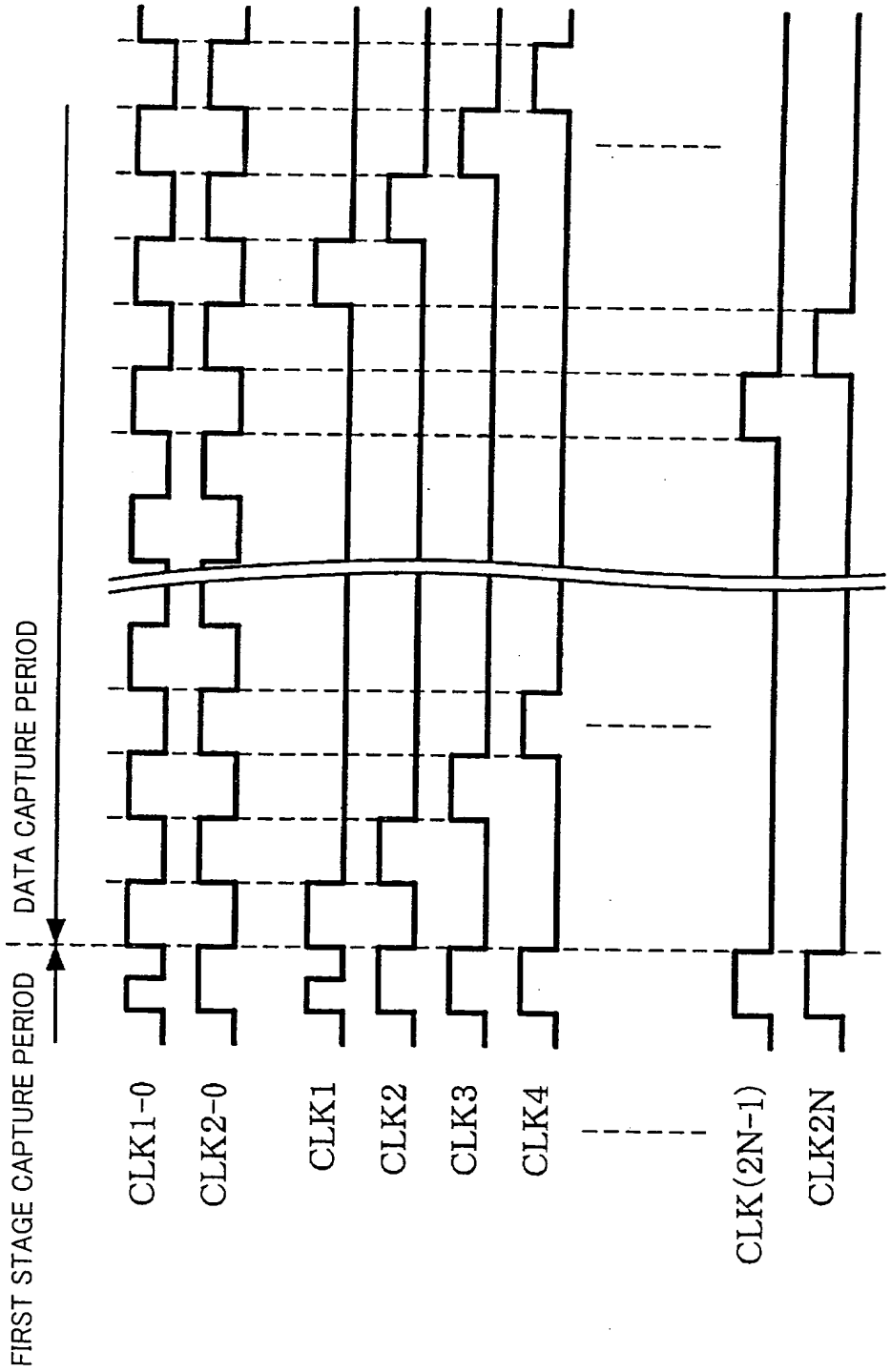

FIRST STAGE CAPTURE PERIOD
DATA CAPTURE PERIOD
CLK1-0
CLK2-0
CLK1
CLK2
CLK3
CLK4
CLK(2N-1)
CLK2N

FIG. 23

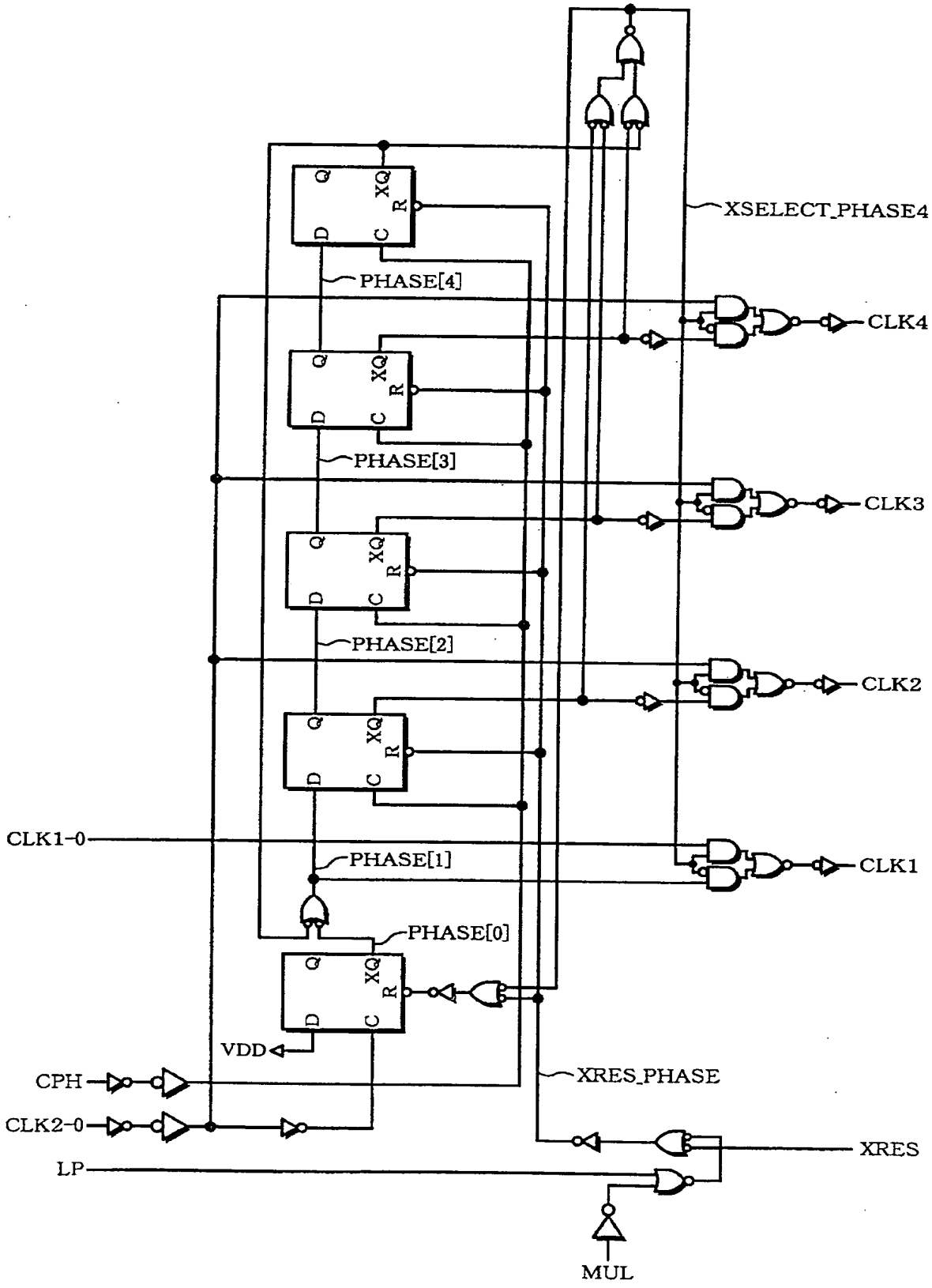

XSELECT_PHASE4
PHASE[4]
CLK4
PHASE[3]
CLK3
PHASE[2]
CLK2
CLK1-0
PHASE[1]
CLK1
PHASE[0]
VDD
CPH
XRES_PHASE
CLK2-0
XRES
LP
MUL

FIG. 24

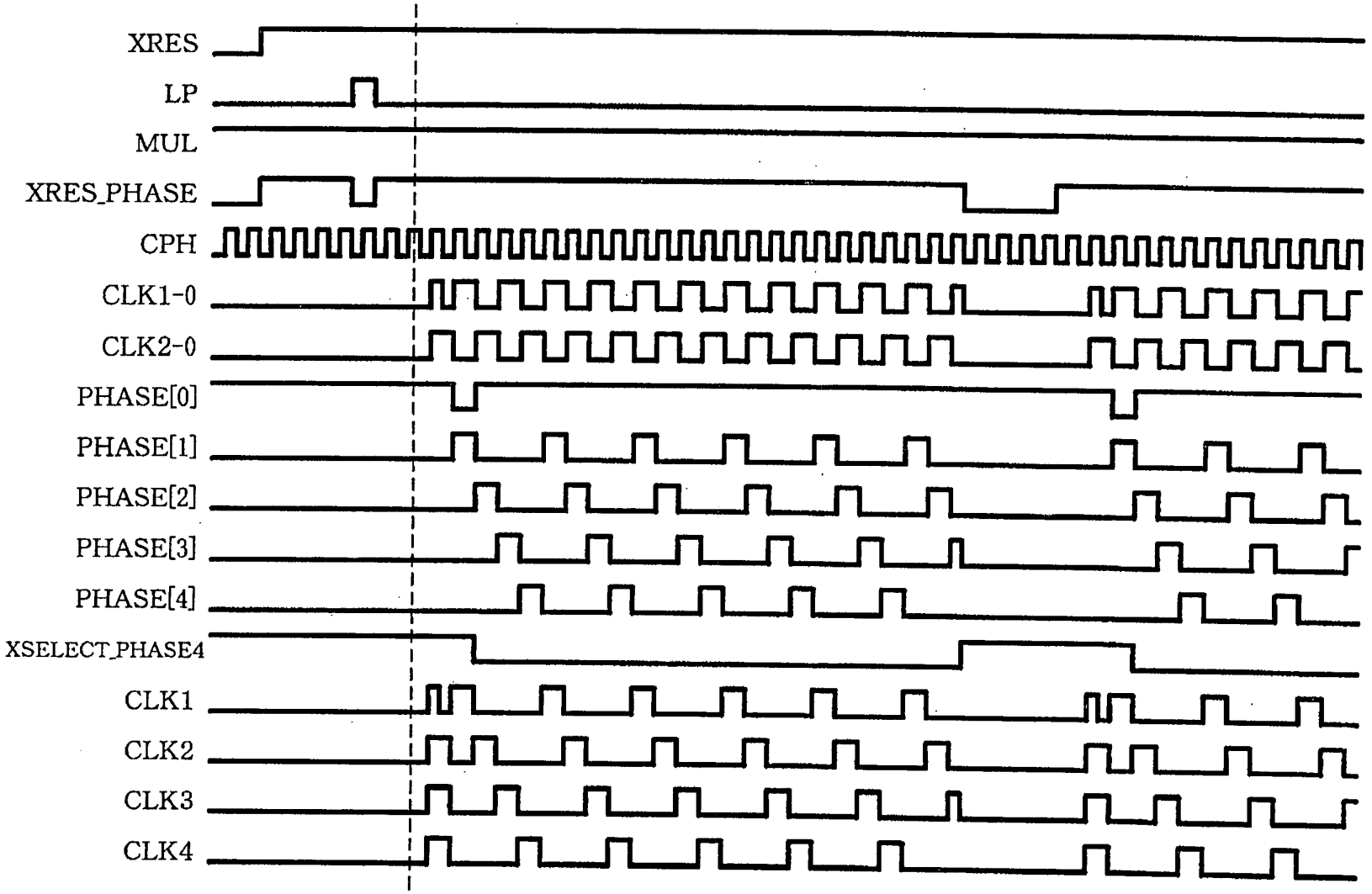

XRES
LP
MUL
XRES_PHASE
CPH
CLK1-0
CLK2-0
PHASE[0]
PHASE[1]
PHASE[2]
PHASE[3]
PHASE[4]
XSELECT_PHASE4
CLK1
CLK2
CLK3
CLK4

FIG. 25

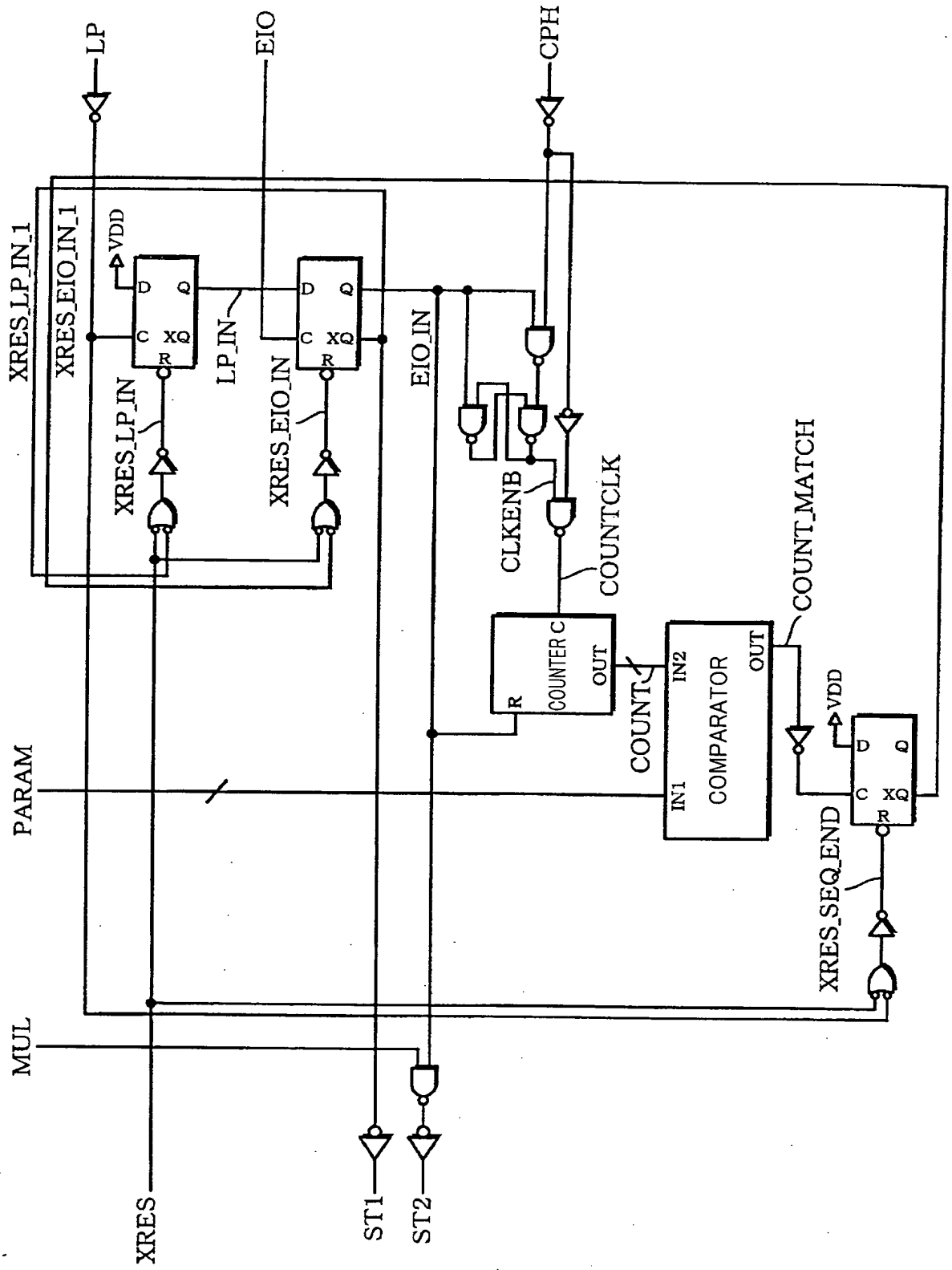

LP
EIO
CPH
VDD
XRES_LP_IN_1
XRES_EIO_IN_1
LP_IN
EIO_IN
XRES_LP_IN
XRES_EIO_IN
CLKENB
COUNTCLK
COUNT_MATCH
COUNTER
COMPARATOR
COUNT
IN1
IN2
OUT
PARAM
MUL
XRES
ST1
ST2
XRES_SEQ_END

FIG. 26

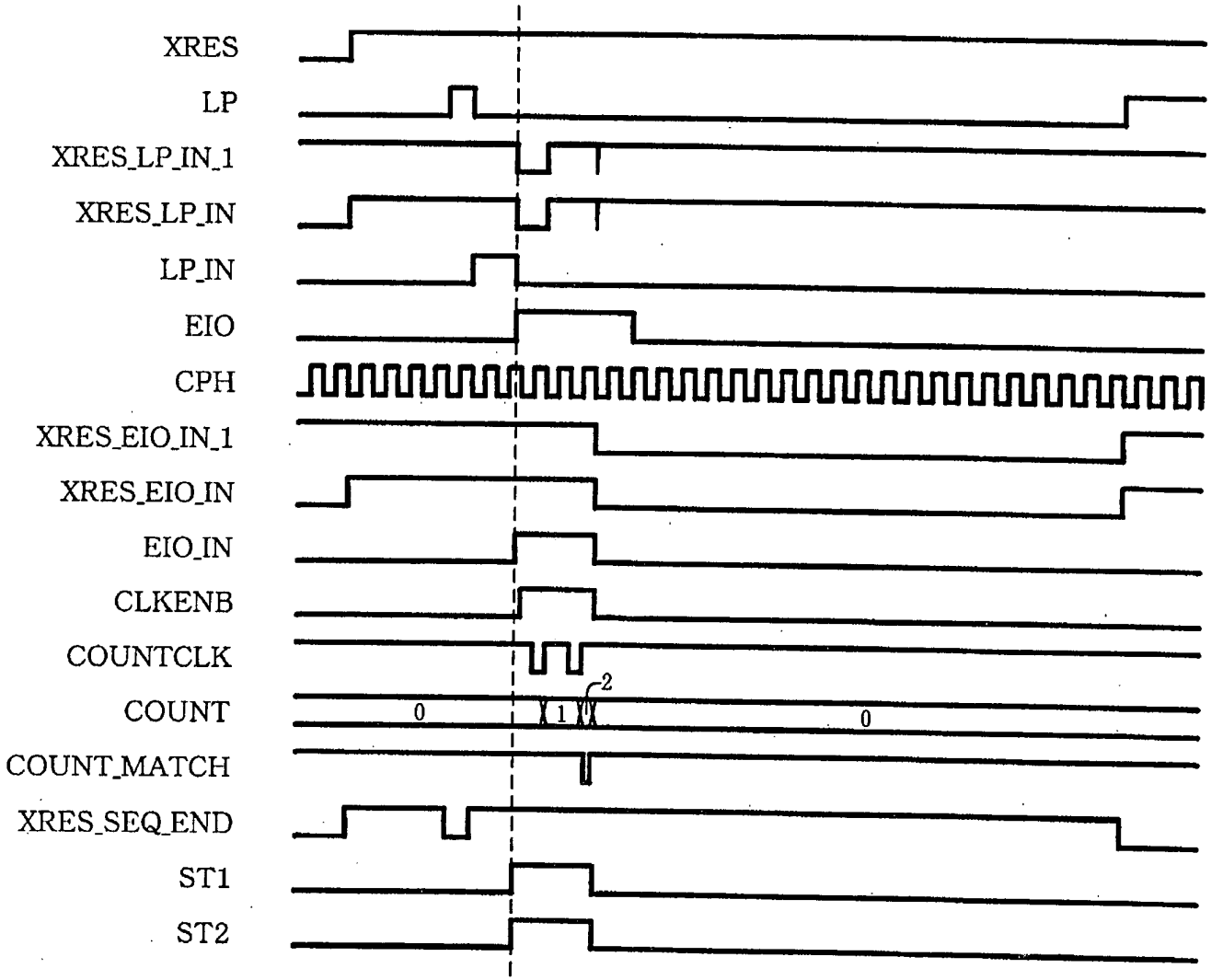

XRES
LP
XRES_LP_IN_1
XRES_LP_IN
LP_IN
EIO
CPH
XRES_EIO_IN_1
XRES_EIO_IN
EIO_IN
CLKENB
COUNTCLK
COUNT
COUNT_MATCH
XRES_SEQ_END
ST1
ST2
0
1
2
0

FIG. 27

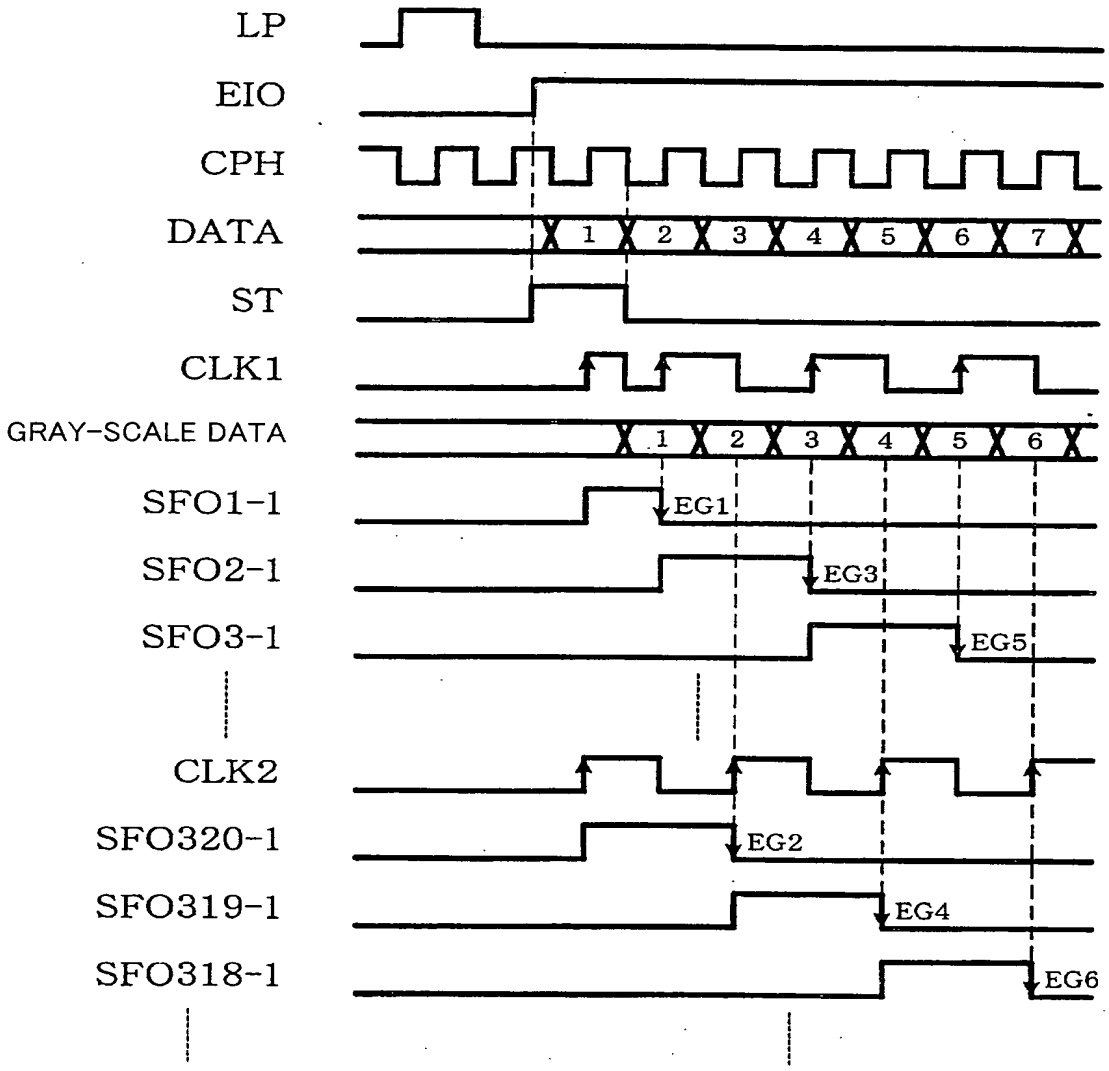

LP
EIO
CPH
DATA
1
2
3
4
5
6
7
ST
CLK1
GRAY-SCALE DATA
1
2
3
4
5
6
SFO1-1
EG1
SFO2-1
EG3
SFO3-1
EG5
CLK2
SFO320-1
EG2
SFO319-1
EG4
SFO318-1
EG6

FIG. 28

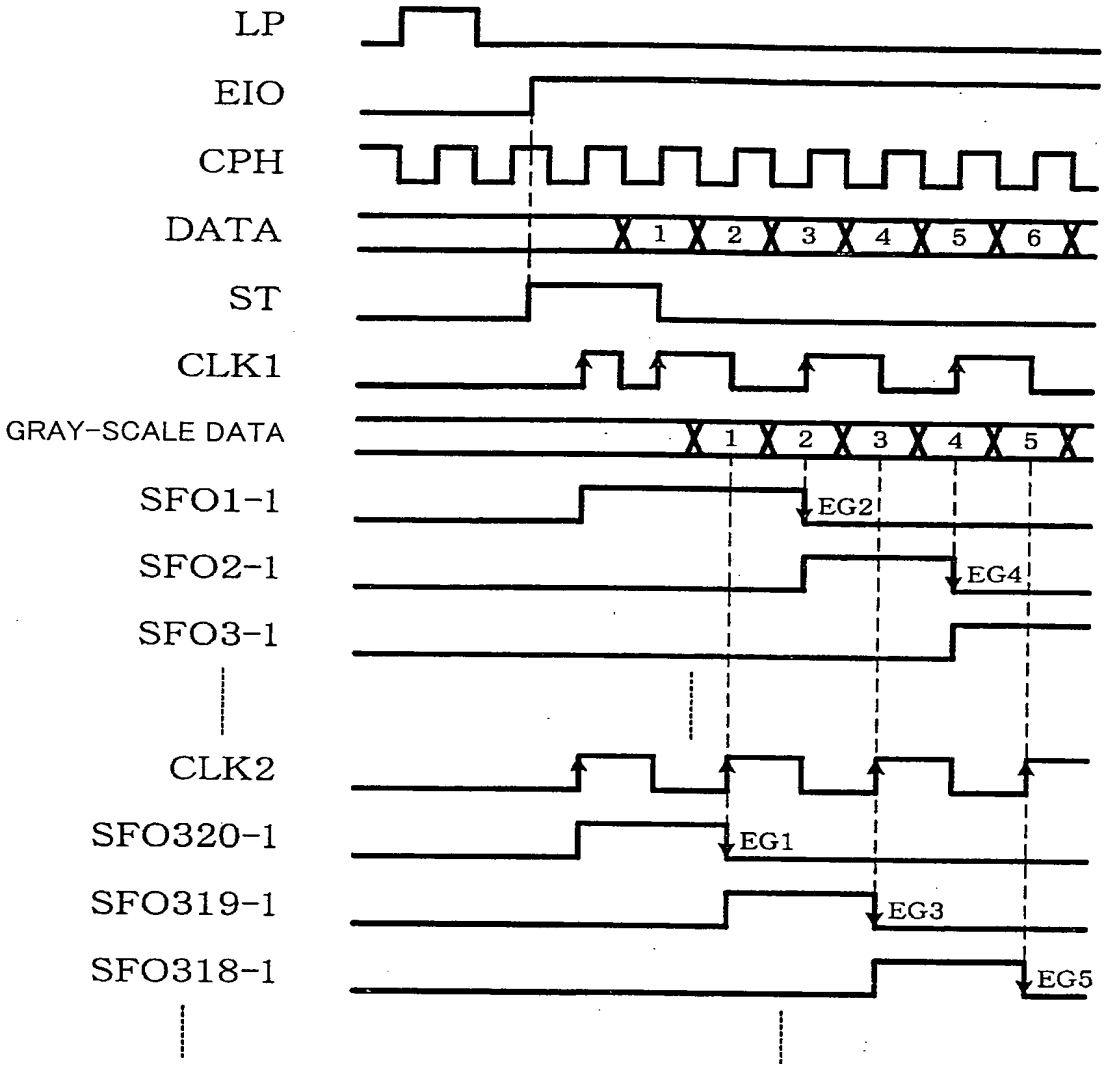

LP
EIO
CPH
DATA
1
2
3
4
5
6
ST
CLK1
GRAY-SCALE DATA
1
2
3
4
5
SFO1-1
EG2
SFO2-1
EG4
SFO3-1
CLK2
SFO320-1
EG1
SFO319-1
EG3
SFO318-1
EG5

FIG. 29

MULTIPLEX	NUMBER OF CLOCK SIGNALS	FIRST GROUP		SECOND GROUP	
		FIRST CLOCK SIGNAL LINE	SECOND CLOCK SIGNAL LINE	FIRST CLOCK SIGNAL LINE	SECOND CLOCK SIGNAL LINE
3	EVEN NUMBER	CLK1	CLK2	—	—
	ODD NUMBER	CLK2	CLK1	—	—
6	4 × n	CLK1	CLK3	CLK2	CLK4
	4 × n + 1	CLK2	CLK4	CLK3	CLK1
	4 × n + 2	CLK3	CLK1	CLK4	CLK2
	4 × n + 3	CLK4	CLK2	CLK1	CLK3

FIG. 30

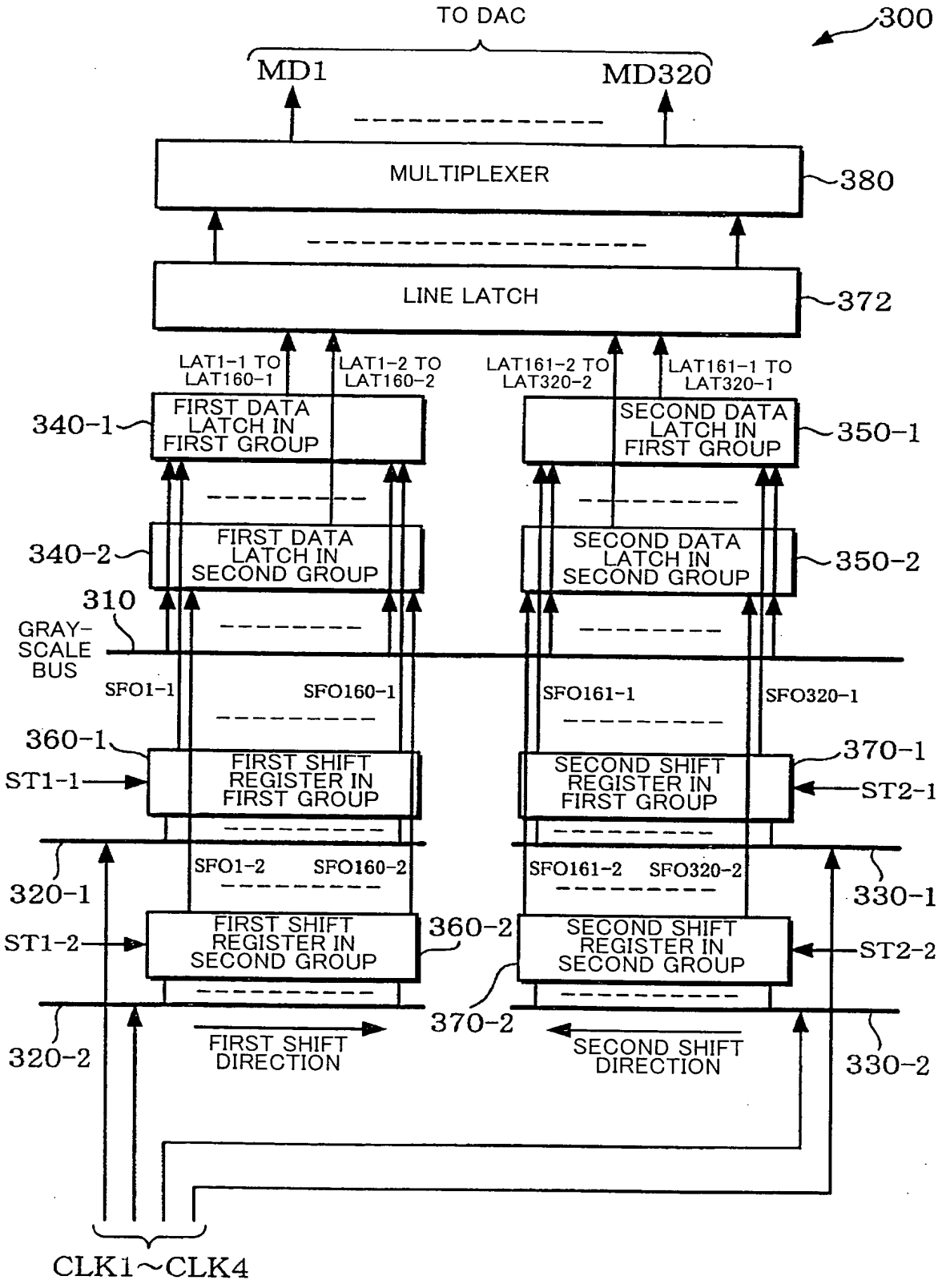

TO DAC
300
MD1
MD320
MULTIPLEXER
380
LINE LATCH
372
LAT1-1 TO LAT160-1
LAT1-2 TO LAT160-2
LAT161-2 TO LAT320-2
LAT161-1 TO LAT320-1
340-1
FIRST DATA LATCH IN FIRST GROUP
350-1
SECOND DATA LATCH IN FIRST GROUP
340-2
FIRST DATA LATCH IN SECOND GROUP
350-2
SECOND DATA LATCH IN SECOND GROUP
310
GRAY-SCALE BUS
SFO1-1
SFO160-1
SFO161-1
SFO320-1
360-1
ST1-1
FIRST SHIFT REGISTER IN FIRST GROUP
370-1
ST2-1
SECOND SHIFT REGISTER IN FIRST GROUP
320-1
SFO1-2
SFO160-2
SFO161-2
SFO320-2
330-1
ST1-2
FIRST SHIFT REGISTER IN SECOND GROUP
360-2
SECOND SHIFT REGISTER IN SECOND GROUP
ST2-2
370-2
320-2
FIRST SHIFT DIRECTION
SECOND SHIFT DIRECTION
330-2
CLK1~CLK4

FIG. 31

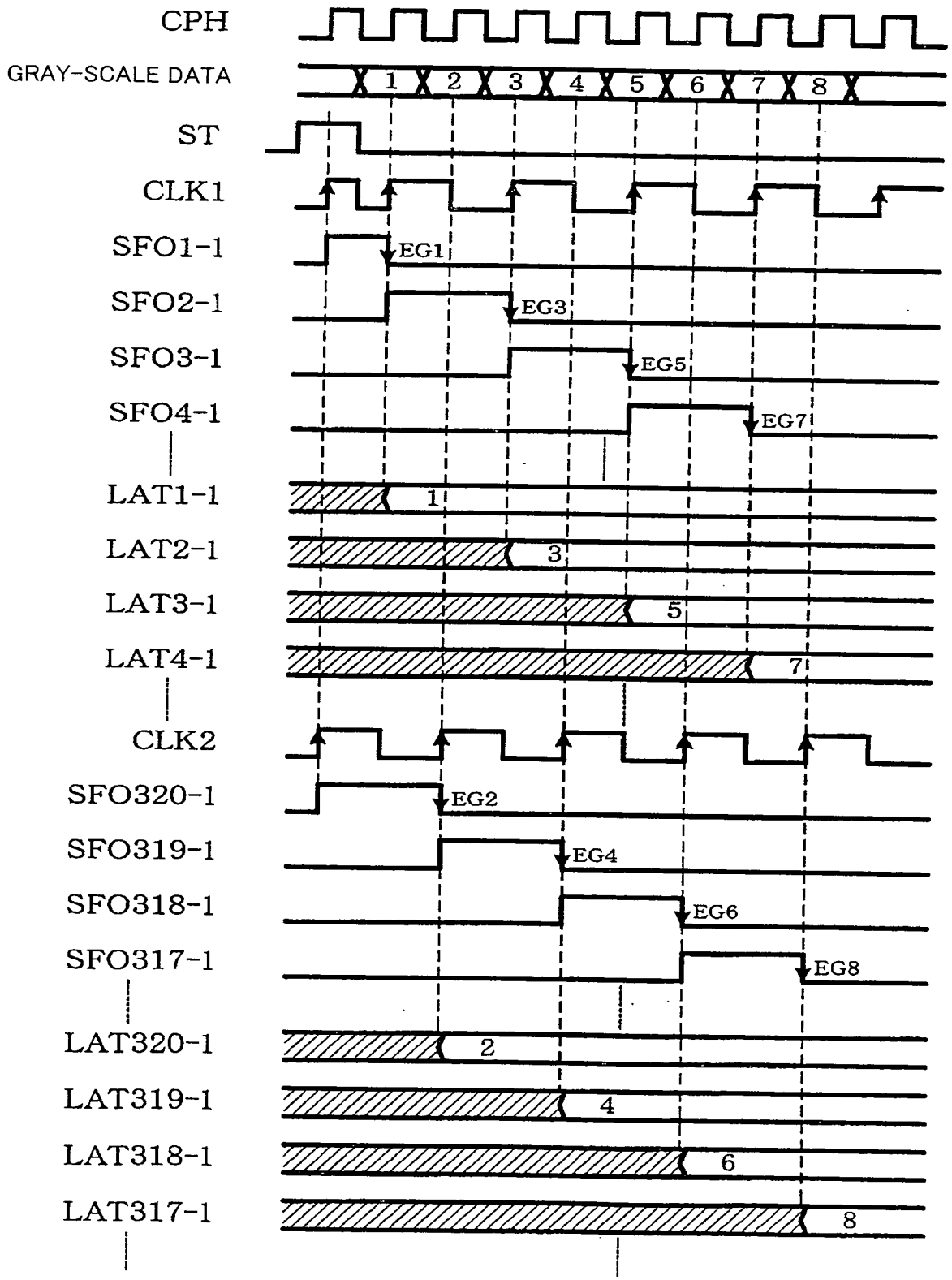

CPH
GRAY-SCALE DATA
1
2
3
4
5
6
7
8
ST
CLK1
SFO1-1
EG1
SFO2-1
EG3
SFO3-1
EG5
SFO4-1
EG7
LAT1-1
1
LAT2-1
3
LAT3-1
5
LAT4-1
7
CLK2
SFO320-1
EG2
SFO319-1
EG4
SFO318-1
EG6
SFO317-1
EG8
LAT320-1
2
LAT319-1
4
LAT318-1
6
LAT317-1
8

FIG. 32

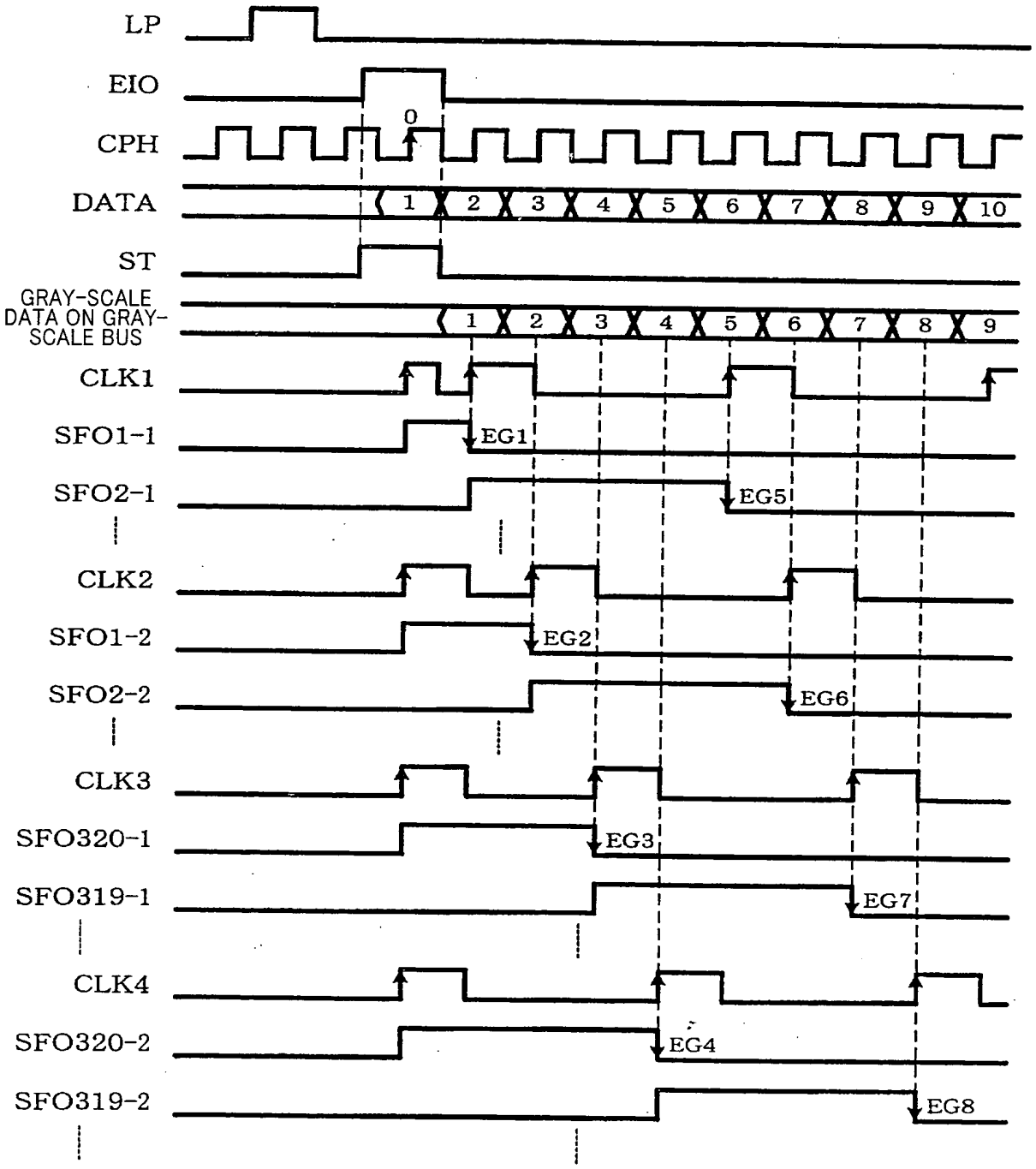

LP
EIO
CPH
0
DATA
1
2
3
4
5
6
7
8
9
10
ST
GRAY-SCALE DATA ON GRAY-SCALE BUS
CLK1
SFO1-1
EG1
SFO2-1
EG5
CLK2
SFO1-2
EG2
SFO2-2
EG6
CLK3
SFO320-1
EG3
SFO319-1
EG7
CLK4
SFO320-2
EG4
SFO319-2
EG8

FIG. 33

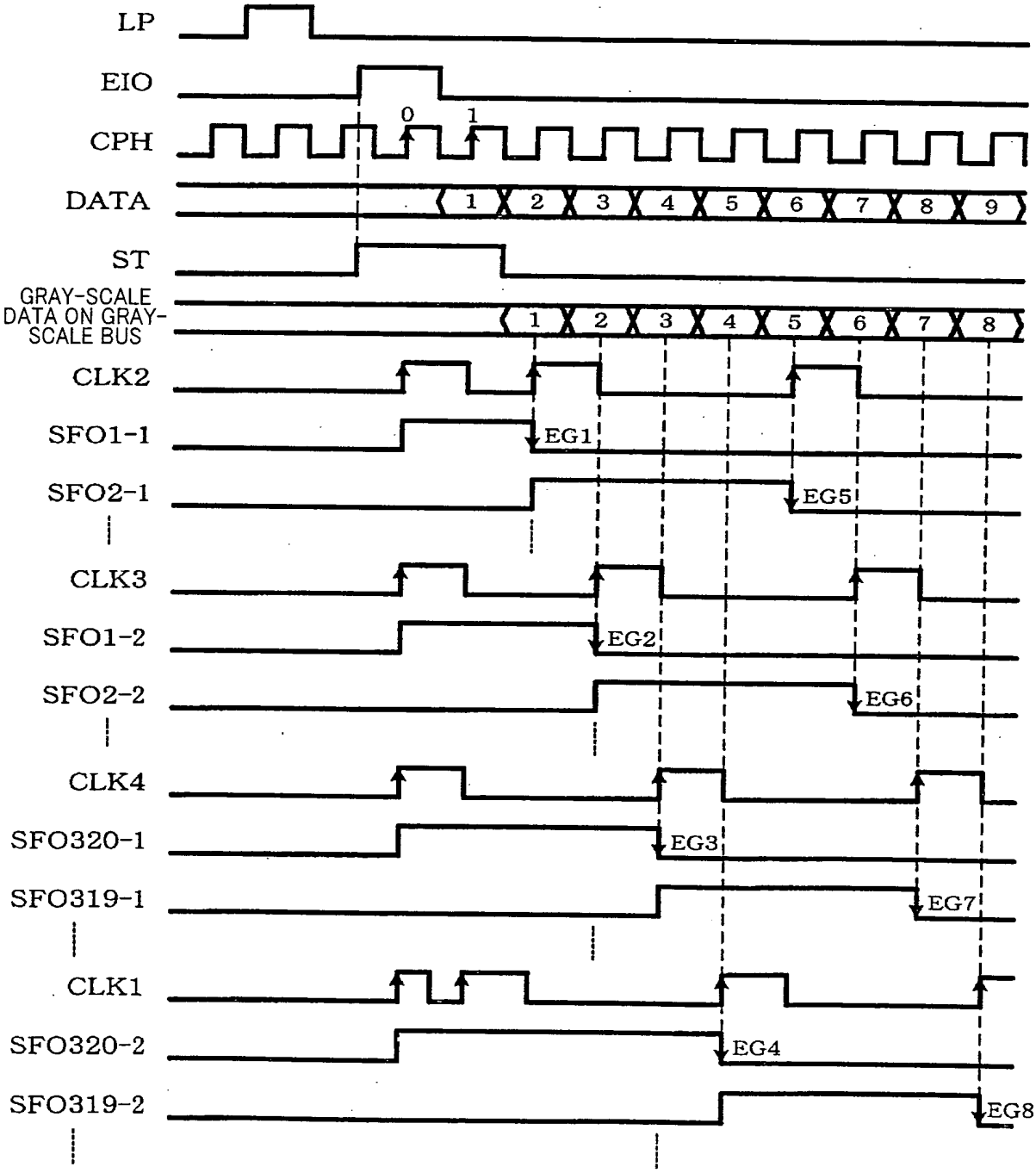

LP
EIO
CPH
0
1
DATA
1
2
3
4
5
6
7
8
9
ST
GRAY-SCALE DATA ON GRAY-SCALE BUS
1
2
3
4
5
6
7
8
CLK2
SFO1-1
EG1
SFO2-1
EG5
CLK3
SFO1-2
EG2
SFO2-2
EG6
CLK4
SFO320-1
EG3
SFO319-1
EG7
CLK1
SFO320-2
EG4
SFO319-2
EG8

FIG. 34

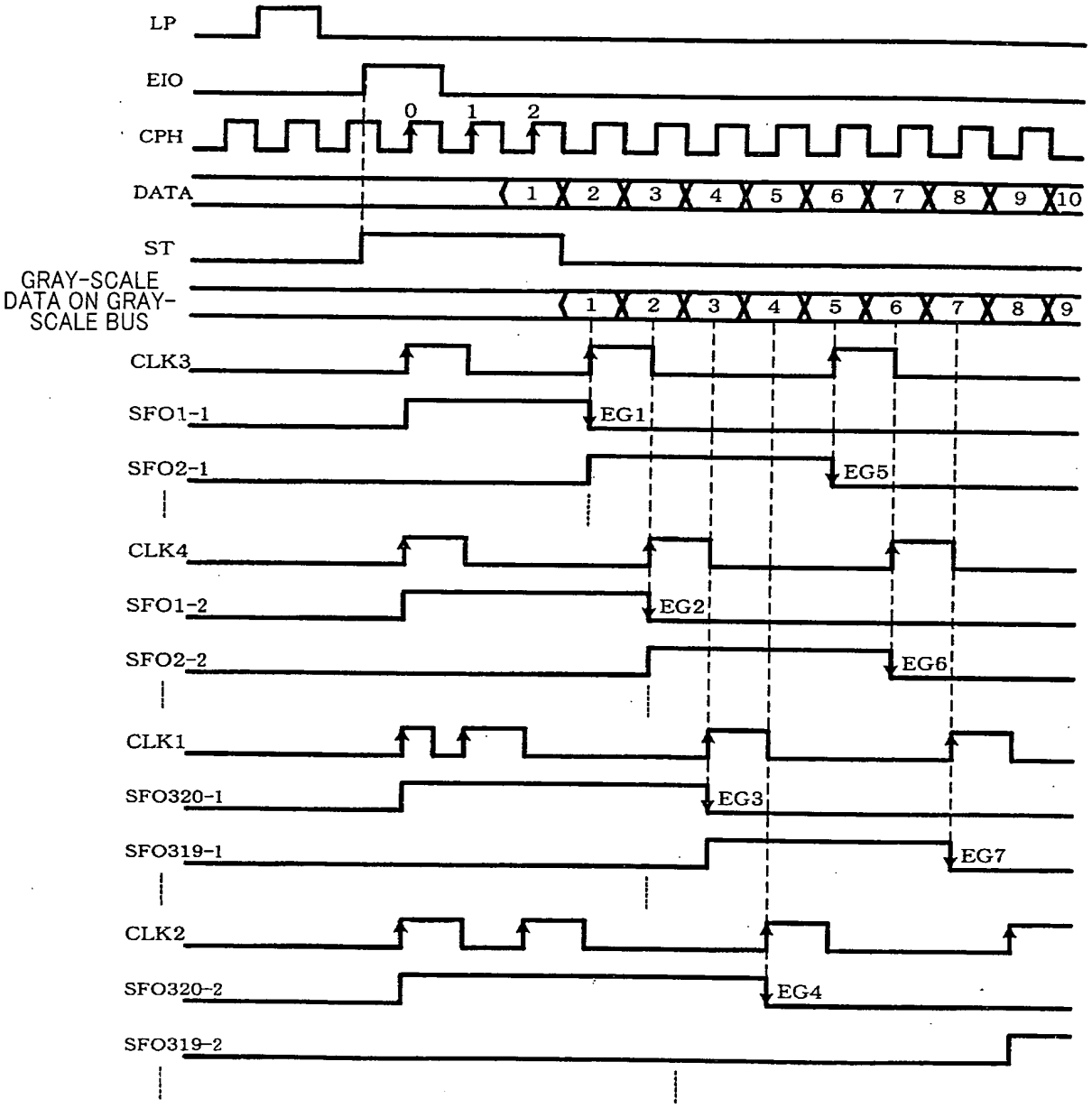
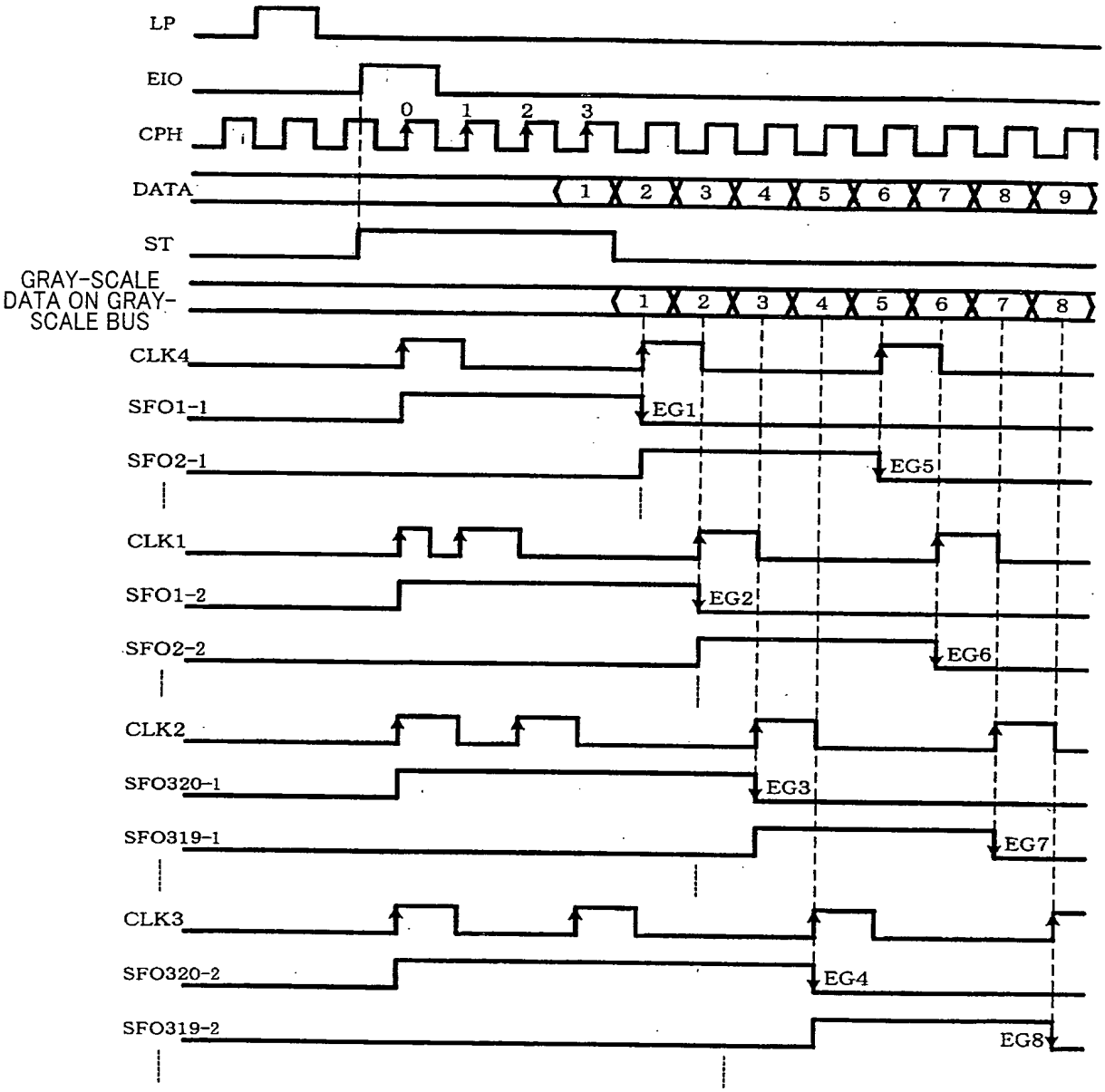

LP
EIO
CPH
0
1
2
DATA
1
2
3
4
5
6
7
8
9
10
ST
GRAY-SCALE DATA ON GRAY-SCALE BUS
1
2
3
4
5
6
7
8
9
CLK3
SFO1-1
EG1
SFO2-1
EG5
CLK4
SFO1-2
EG2
SFO2-2
EG6
CLK1
SFO320-1
EG3
SFO319-1
EG7
CLK2
SFO320-2
EG4
SFO319-2

FIG. 35


LP
EIO
CPH
0
1
2
3
DATA
1
2
3
4
5
6
7
8
9
ST
GRAY-SCALE DATA ON GRAY-SCALE BUS
1
2
3
4
5
6
7
8
CLK4
SFO1-1
EG1
SFO2-1
EG5
CLK1
SFO1-2
EG2
SFO2-2
EG6
CLK2
SFO320-1
EG3
SFO319-1
EG7
CLK3
SFO320-2
EG4
SFO319-2
EG8